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No. 7

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CONTENTS

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MEANS OF INCREASING PRODUCTION OF GRAIN AND FEED, OF IMPROVING EFFECTIVENESS AND STABILITY OF AGRICULTURE

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 1-15

[Article* by Academician P. P. Vavilov, president of VASKhNIL (All-Union Academy of Agricultural Sciences imeni V. I. Lenin)]

[Text] Concern about creating and multiplying the foodstuff stock, our daily bread, has always been in the center of our party's attention. Comrade Leonid Il'ich Brezhnev wrote in his remarkable book "Virgin Soil," "Grain has always been the most important product, the gage of all values. And in our era of grand scientific and technological achievements, it is the foundation of the life of the people. People have broken through into space, they are conquering rivers, seas and oceans; they are recovering oil and gas from the depths of the land; they have harnessed the energy of the atom, but grain is still grain."

It is unlikely that one could describe more fully and better the role and importance of grain, which is the gage of everything that is the most essential to the life of people.

As it was stressed in the party's decisions, continued advancement of agriculture is a most important social, economic and political task, which is of enormous domestic and international significance. In the last few years, several major problems of development of agriculture have been solved in our country. As a result of implementation of the agrarian policy elaborated by the March (1965) plenum of the CC CPSU, there has

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*[Translator's note: the following announcement pertains to this and the next two articles] "Implementation of CPSU Decisions! The main objective for agriculture is to provide for continued growth and much stability of agricultural production, comprehensive increase in efficiency of agriculture and livestock breeding to better meet the needs of the public for foodstuffs and those of industry for raw material, as well as to create the necessary state reserve of agricultural products"--from the decisions of the 25th CPSU Congress.
From a paper delivered at the scientific session of VASKhNIL on 11 Mar 80.

been further development of both productive forces and industrial relations. A better material and technical base has been created. With each year, rural areas are receiving an increasing amount of machinery and equipment, fertilizers and pesticides; increasing use is being made of reclamation, new and highly productive cultivars, more sophisticated industrial technology, and there has been expansion of economic and direct ties between rural areas, industry and other sectors of the national economy. A unified national agroindustrial complex is being formed.

All this has made it possible to augment radically the economic potential of agriculture, and to increase significantly the stability of agricultural production. The mean annual harvest of grain for 4 of the years of the 10th Five-Year Plan has been brought up to 209 million tons, which is almost 27 million tons more than under the 9th Five-Year Plan. Even last year, when there was an acute drought, 179 million tons of grain were harvested, whereas 15-20 years ago we harvested no more than 100 million tons in years with analogous weather conditions. However, as stated at the July (1978) plenum of the CC CPSU and stressed once more by the general secretary of the CC CPSU, comrade L. I. Brezhnev, chairman of the presidium of the USSR Supreme Soviet, at the November (1979) plenum of the CC CPSU, the overall level of development of agriculture in our country does not yet meet the rapidly growing needs of society.

Under the last three five-year plans, capital investment in agriculture reached 400 billion rubles. Thus, our modern agricultural industry, in particular, agriculture, has an unprecedented economic potential, the more rational use of which makes it possible to successfully perform the task of providing the nation with grain, feed and livestock products.

However, we are all worried by the fact that the material resources and capital investments are not being used efficiently enough. The cost of production is increasing at some farms, and other economic indicators are deteriorating. Our agriculture is still strongly influenced by changing climate and weather conditions, and it is not resistant enough to adverse factors. In some parts of the nation, the gross grain harvest is 2-3 times greater in clement years than inclement ones. The drastic fluctuations in agricultural production disrupt the rhythm of development of the nation's entire economy, they have an adverse effect on supplying the public with foodstuffs and make it necessary to import large amounts of grain and other products. For this reason, it is exceptionally important to increase the efficiency and stability of agriculture in the work of both scientific and industrial groups. Stability refers to the constant growth of production volume, on which adverse conditions could only have a minimal effect.

The progressive knowhow in agricultural management is indicative of the fact that reliable agricultural achievements are possible only if there is a high degree of sophistication thereof. In this regard, we should like

to give a definition of the concept of sophisticated agriculture. This refers to a wide range of questions, the key ones being scientifically substantiated organizational, economic, biological and agrotechnical measures for the consistent increase in soil fertility and rational use of soil, wise use of technology and highly productive agricultural cultivars. The main indicators of sophistication of agriculture are the harvest obtained, quality of products, volume and cost of their production. Thus, we refer to highly sophisticated agriculture to describe implementation of the set of economically warranted measures that conforms with the current level of development of science and productive forces of society, and that provides for maximum yield from the crops that are raised.

According to this definition, the consistent growth of soil fertility is the core of agricultural sophistication. This is understandable, since expanded reproduction of soil fertility is the main prerequisite for growth in productivity of fields, meadows and pastures, increased stability of production referable to plant growing and animal husbandry. At the present stage, this is probably the main problem of all agricultural science. Soil fertility creates the necessary background for highly efficient use of all other factors and conditions that affect the harvest level and, first of all, technology, modern chemistry and, of course, highly productive cultivars. Studies of intensively used soils, which have been conducted recently by several scientific institutions, indicate that the most important integral indicators of soil fertility and extent of cultivation are the soil humus content, as well as its physicochemical properties and, in particular, its agronomic structure. Soil fertility is largely determined by the amounts of minerals in it, moisture and physical properties, biological activity which, in turn, is related to temperature conditions.

Practice has shown that, in order to obtain large and stable harvests, one must know how to control these processes in soil, i.e., one must be a good agronomist, with proper knowledge of his soil and crops raised in it. In a word, the problem of increasing fertility of soil is quite complex and multifaceted, but it is interesting and fascinating. In order to solve it in our times, it is necessary, and we wish to stress this specially, for scientists in several specialties to join forces--soil scientists and cultivators, plant physiologists and agrochemists, climatologists and meteorologists, biologists and microbiologists, ameliorators [specializing in reclamation] and machine operators, plant growers and economists. Multilevel studies are required for demonstration of the patterns of the soil-forming process against the background of man's intensive industrial activity and of the trends of growth of soil fertility in different climates, and mainly development of the necessary steps, on this theoretical basis, to control the dynamics of soil fertility, eliminate deleterious factors that lower soil productivity. Consequently, agronomic science is called upon to answer the following question: What optimum parameters--agrophysical, chemical, biological and other--must

the soil have and what must be done to obtain the planned high yields. On this basis, it would be possible to elaborate effective procedures for each specific field to augment soil fertility and, by using them, to attain large and stable harvests under existing weather conditions.

Thus, to increase the efficiency and stability of agriculture it is necessary, first of all, to have exemplary order at each kolkhoz and sovkhoz on the fields, meadows and pastures, to obtain progressive increase in soil fertility and normal profitability of plant growing as a whole. All this will, of course, require a high degree of sophistication of specialists, particularly machine operators, who are the main participants in implementing the achievements of science, technology and progressive knowhow in practice; it is also important for them to be armed with the most productive technology to aid in increasing soil fertility.

Analysis of the agroclimatic resources of our country shows that the absolute majority of agricultural land is in the zone of temperate and cold climate. In almost all areas one has to protect plants against the low temperatures of wintertime. In the summer, during the period of plant vegetation, many regions are stricken by drought. The main areas that produce commercial grain are situated in areas where the mean annual precipitations are less than 400 mm. Over a period of 100 years of observations, it was estimated that severe drought occurs about once every 3 years in Povolzh'ye regions, once every 5 years in Rostovskaya and Voronezhskaya oblasts, once every 8 years in Bashkirskaya ASSR, Tatarskaya ASSR, Mordovskaya ASSR and in the Ukraine.

For a long time, Soviet science has searched for the means of alleviating the deleterious manifestations of climate and weather. P. A. Kostychev, V. V. Dokuchayev, A. A. Izmail'skiy, K. A. Timiryazev, V. R. Vil'yams, D. N. Pryanishnikov, N. M. Tulaykov and others were the founders of research in this field. On the basis of their scientific ideas, scientists and production specialists have gathered quite a few ways and means of averting the negative effects of climate and weather. In-depth studies of the patterns of plant life, effects of various natural factors on their productivity, the discovery of new research methods and development of modern technology have enabled scientists to demonstrate, in the last few years, more completely the biological potential of plants. At present, the task of learning how to make the utmost use of this biological potential looms before us, in order to assure stability of plant growing and all of agriculture, and first of all to implement the main task that the party has put to agriculture, that of achieving comprehensive, dynamic development of all its sectors, reliably furnishing foodstuffs and agricultural raw material to the nation. It is imperative to raise the mean annual gross grain harvest to at least 238-242 million tons in 1981-1985.

The grain industry was and remains the foundation of the nation's entire foodstuff complex. About 60% of cultivated areas are reserved for grain crops, and, as we have already stated, our main grain base is situated in a region where there is not enough precipitation, which makes it even more pressing to develop measures to assure guaranteed grain harvests. In essence, such recommendations have already been made by science, and implementation thereof is yielding impressive results.

In this respect, the practical achievements of many experimental farms of scientific research institutes under VASKhNIL (All-Union Scientific Research Institute of Grain Farming, All-Union Scientific Research Institute of Plant Growing, All-Union Scientific Research Institute of the Mixed Feed Industry, All-Union Scientific Research Institute of Fertilizers and Soil Science, All-Union Institute of Selection and Genetics and others), which demonstrated that the use of measures developed by these institutes yields large and stable harvests regardless of weather conditions, are very interesting. Crop rotation is also very important. In the last 10-15 years, grain-intertilled crops and grain-fallow land rotations have yielded maximum harvests and grain in steppe regions. In areas with more humidity, grain-fallow land-intertilled crops and grain-intertilled crop rotations have made a good name for themselves, whereas in the forest zone this applies to crop rotation, grain-grass and grain-intertilled crop rotation. This is also indicated by the experience of many progressive farms in different parts of the country, including the Gigant Sovkhoz in the steppe region of Rostovskaya Oblast. The use of proper crop rotations, an improved system of seed growing, use of clean fallow land, rational structure of sowing areas, use of fertilizers and other measures have resulted in stability of harvest at this farm, even in the driest years. With the existing specialization of this sovkhoz, it utilizes tilled land as follows: 66% for grain crops, 8% for industrial crops, 13% for livestock feed and 13% is fallow. In the last 30 years, the grain crop harvest increased from 11.2 to 26.5 q [quintal]/ha [hectare], while in the 4 years of the 10th Five-Year Plan it constituted a mean of 32.2 q/hs. During 1979, which was a difficult year, the sovkhoz obtained 32.5 q/ha grain, versus 23.3 q in farms of Sal'skiy Rayon, where this sovkhoz is located. The Gigant Sovkhoz uses the fallow land-intertilled crop system of agriculture, the main element of which is bare fallow, which provides for effective control of weeds and accumulation of moisture in the soil. At this sovkhoz, bare fallow is the main precursor of winter wheat.

However, science still owes much to industry. Many scientists and practicing specialists have demonstrated on specific examples the role of fallow in increasing production of grain and other agricultural products. We cannot fail to agree with this evidence. Fallow does indeed play an enormous role, particularly in arid regions of the country. According to estimates submitted in the USSR Gosplan, USSR Ministry of Agriculture and VASKhNIL, there should be 20 million ha of fallow land in the nation, i.e., about 9.2%. At the present time, 12.4 million ha are fallow, or 5.7%.

Such problems should be solved more boldly on the local level. But one cannot tolerate the existence of fallow land beyond the optimum time, have it overgrown with weeds, without receiving fertilizers and being cultivated at the proper time. There will be no use from such fallow. At the same time, one should not set bare fallow against other forms of fallow, that are occupied, early, etc. When determining the location of fallow land one should take into consideration, first of all, the soil-climate and weather conditions.

The second, equally important factor for increasing grain production is to improve the structure of the grain field as a result of expanding fields of the most productive crops. It is a known fact that winter wheat and rye are the most productive crops in the main areas where they are traditionally raised. At the same time, their share of planted areas has diminished significantly, since less valuable crops have been planted on larger areas. In the last few years, there was unwarranted reduction of area planted with winter rye, the fields of which presently constitute only about 8 million ha. Expansion of fields used for winter rye, particularly in several oblasts of the Nonchernozem Zone, where winter wheat often perishes in the winter, is an essential element in the system of measures aimed at increasing grain harvests.

In the regions of West Siberia and the Urals, barley yields larger harvests than spring wheat, and if we consider the fact that a significant amount of spring wheat grain is used for animal feed, apparently one should examine more attentively the structure of grain crop fields in these regions. Scientists and producers devote little attention to such valuable crops as millet and buckwheat. There has been a reduction in fields planted with them and productivity of these crops.

Corn, being one of the most productive crops, is very important to increasing grain production. However, its productivity is increasing slowly. One of the causes is the lack of highly productive early ripening cultivars and hybrids.

At the same time, the use of industrial technology made it possible to obtain in 1979 an average of 51.5 q/ha over an area of 160,000 ha, which is 23.8 q more than with the use of traditional technology. All fields of corn raised for grain will have to be raised using industrial technology in the immediate future (provided the farms are furnished with modern technology, the required amount of fertilizers and pesticides), and this will have a beneficial effect on growth and stabilization of harvests. In 1980, industrial technology is already being used over an area of 1.14 million ha. One must expand the cultivation of corn, and we must have our own corn region. This is a realistic goal if the work is properly organized and, of course, capital investments are made.

Rice occupies an important place in the structure of cultivated areas in the southern part of our country. The decisions of the March (1965) and May (1966) plenums of the CC CPSU played a decisive role in development of rice growing. Rice production increased from 580,000 tons in 1965 to 2.3 million tons in 1979. In these years, the total area on which rice is cultivated has more than tripled and presently exceeds 600,000 ha.

Rice growing is developing the best in Krasnodarskiy Kray. This is where the All-Union Scientific Research Institute of Rice was established. Engineering rice charts with a broad line of flooding and drainage (Kubanskaya) have been developed through the efforts of Kuban' scientists, designers and builders. There is no analogue in foreign rice growing to these engineering charts. In this industry, wide use is made of Krasnodarskiy 424 and Kuban' 3 cultivars, developed by the institute, and 2 new highly productive cultivars, Start and Spal'chik, have been assigned to rayons in 1980. This institute has proposed a technology for rice growing that permits harvesting 75-100 q/ha.

At the same time, there are some unsolved problems that require immediate solutions in rice-growing science and practice. Development of cultivars is still too slow, and primarily of those that would be resistant to fungus diseases; too little attention is being given to preparation of short and long term forecasts of appearance of pests and diseases; further refinement of machinery and tools for cultivating and harvesting this crop is needed; this industry is poorly supplied with herbicides and insecticides produced in our country. Unfortunately, no crop rotation system has been developed for rice-growing areas. The effectiveness of this sector would increase significantly if these problems are solved.

We should call special attention to the problem of feed production, since the stability of agriculture at the present time is inseparably linked with stability of feed production. The increase in stability and production of livestock products, the share of which is constantly increasing in the diet of the public, depends expressly on solving this problem. It is common knowledge that the acute shortage of feed protein is the most important cause of the slow rate of growth in production of livestock products and excessive outlay of feed, including grain. Diets that are balanced with regard to protein content would reduce feed outlay by 20-30% and make it possible to direct an enormous reserve of 80-120 million tons of feed units toward increasing milk and meat production.

Leguminous crops are a most important source of feed protein production. However, in the last few years, their share of the overall grain balance is diminishing. While the share of leguminous crops in the structure of spring grain crops constituted 7.5% in 1965, at the present time it is only 5%. In 1965, leguminous crops constituted 7% of all grain production and in 1978 only 3.2%. The mean yield of leguminous crops was only negligibly lower than that of spiked grain crops: 13.6 q/ha under the 8th

Five-Year Plan, 12.7 q/ha under the 9th and 15.4 q/ha in 3 years of the 10th Five-Year Plan. In view of the fact that leguminous crops contain 2.5-3 times more protein and 3-4 times more lysine, it is becoming obvious that the area occupied by leguminous crops must be expanded in the immediate future, so that the yield thereof will constitute 20-25 million tons, which would reduce substantially the shortage of protein in the livestock industry. One must develop research directed toward developing effective technologies for raising leguminous crops, developing highly productive undeciduous and lodging-resistant cultivars. In 1978, Neosypayushchiysya 1 [nondeciduous] peas were already assigned to rayons, and this cultivar must be put in production at a faster rate, with concurrent expansion of breeding work in this promising direction. Unfortunately, the All-Union Institute of Leguminous Crops has not yet coped with the tasks put to it. Poor use is still being made of reserves for both field fodder production and meadow-pasturage, as well as by-products of plant growing.

The proper choice of structure and direction of development of the feed base plays a decisive role in development of intensive livestock production. It is common knowledge that too much grain is used for feed purposes. At the same time, very little use is being made of such an important source of fodder as natural hayage and pasturage. Thus, while the harvest of natural hayage constituted 9.0 q/ha and overall yield was 60.7 million tons in 1940, the figures for the last 5 years were 5.2-6.4 q/ha and 45.1-49.3 million tons of hay, respectively. And this is the situation at a time when the labor and energy expended per quintal of feed units obtained from hay are lower than for the production of 1 q feed unit of grain origin. The existing methods of superficial amelioration of meadows and pastures increase their productivity by 1.5-2 times. If specialists and farm managers paid more attention to this problem and rural areas were better supplied with hay-gathering machines and equipment, an additional 12-15 million tons of hay could be obtained in the next few years, which is the equivalent of 5-6 million tons of grain.

The structure of feed production on fields also requires significant refinement. In spite of the fact that areas occupied by feed crops, not counting natural meadows and pastures, presently exceed 65.7 million ha, there is considerable instability in supply of feed to the livestock industry. Enormous areas are occupied essentially by three groups of crops: perennial and annual grasses, corn for silage and green fodder, and feed root crops. The productivity of perennial grasses is still low, while there is a small share of alfalfa in the structure of these fields, although it is the most productive crop and has the highest protein content.

The composition of annual grasses is also quite unsatisfactory. By reducing the area occupied by crops with low productivity, one could expand significantly cultivation of crops with high protein and high oil content, such as soybeans and rape in the southern region of European USSR and Central Asia, rape and oleaginous radishes in Siberia, and lupine in the Nonchernozem region on light soil.

Under the conditions prevailing in the USSR, expansion of area planted with soybeans encounters a number of problems, since this crop, which originated in a monsoon climate, requires heat and moisture. At the present time, intensive work is in progress to develop new, early ripening soybean cultivars with outstandingly high seed yield, suitable for cultivation in the European part of our country. All this gives us hope that there will be expansion, within the next few years, of area planted with soybeans to 400,000-500,000 ha, from 120,000 ha in 1979.

But the most realistic means of providing a speedy solution to the protein problem is to increase cultivation of peas and perennial leguminous grasses. The use of corn for silage has a great potential as a reserve. Its productivity has constituted only 150-160 q/ha on the average for the entire country in the past few years. In view of the fact that the feed value of the green mass of corn is low, while loss during harvesting, transportation, silaging and storage is in excess of 25-30%, cultivation thereof in some regions has not yet aided in strengthening the feed base. At the same time, corn has a very high potential, and we have large reserves in this regard.

Science and practice have developed and tested methods of raising corn for silage with cobs at the milk- and yellow-ripe stages, which yield 500-700 q/ha in the Ukraine and central chernozem regions, and 250-350 q/ha in the southern and central parts of the Nonchernozem Zone. However, introduction of this technology is being delayed because of the lack of seeds of early ripening hybrids, modern highly productive equipment, fertilizers and herbicides. Analogous problems arise in cultivating such a valuable food and feed crop as potatoes. This labor-consuming crop has stably occupied 7-8 million ha in our country for 40 years. The technology is being refined, new cultivars are being developed, more fertilizer is being used for this crop, while the yield is still on the level of 100-120 q/ha.

Decisive measures are required to refine potato seed growing (following the example of Belorussia), as well as complex mechanization of potato farming, construction of warehouses at kolkhozes and sovkhozes, establishment of specialized associations for potato farming. Broader use should be made of the experience of storing and processing potatoes into intermediate products where they are raised, with the use of waste to feed cattle. There is slow expansion of areas planted with new highly productive cultivars of potatoes with complex resistance to fungal, bacterial and viral diseases. There are still many unsolved problems with regard to establishment of closed regions for the production of aviral seed potatoes in all parts of our country. Special attention should be given to expansion of fields of early and moderately early ripening cultivars in the Nonchernozem Zone. It should be stressed that the potato is one of the few crops that makes the most efficient use of precipitations in the second half of the summer, thus providing for high stability of agriculture.

The intermediate products of plant growing are being used very inadequately for animal feed purposes. The most important of them are straw and sugar beet leaves. Less than 100 million tons of straw are used annually as cattle fodder, while the rest, more than half, perishes or is burned. In addition, even the straw that is used often contains soil due to deficient harvesting technology, and is almost wanting in its most valuable part, the chaff. The universal attachments for the Niva combines, which are used instead of stackers, make it possible to gather and utilize straw and chaff; however, because of the inefficiency of agricultural machine building, this technology is not supplied with equipment [machinery] and is used over 10-12% of the entire area planted with leguminous crops.

One can augment the feed value of straw by processing it before use. In our country and abroad methods have been developed for physical, chemical and biological treatment of straw. At the present time, the hydrobarothermal method of treating straw is being introduced with success, which increases its nutrient value and consumption. Introduction thereof should be accelerated.

With reference to the question of increasing the effectiveness and stability of agriculture, it should be borne in mind that over 70% of the organic matter produced on agricultural land is used in livestock farming. For this reason, planning of a significant share of plant-growing production should be governed by the objective of meeting to the utmost the requirements of farm animals, optimization of feeding processes that would provide for drastic increase in their productivity with decrease in feed outlay per unit production.

On the other hand, increasing stability of development of the livestock industry will depend on solving other problems as well, such as optimization of proportion between sectors of the animal industry in accordance with the natural and climatic capabilities of feed production in different parts of our country, drastic improvement of technology of storage and processing of feed, creation of a reserve stock of feed in clement years, etc.

There is another extremely important problem, the solution of which could become a substantial factor in growth of agricultural production and strengthening of stability thereof. We refer to development of regions in the North. This problem was first raised as far back as 1931 by N. I. Vavilov, who wrote: "The struggle for stable agriculture in our continental country advances the task of moving agriculture to more reliable northern regions with a wetter climate" (N. I. Vavilov, "Selected Works," Vol 5, p 510). In essence, he had already expounded then the idea of reclaiming the Nonchernozem Zone of the RSFSR, which is now being done.

With the rapid development of industry and population growth in the North and East of our country, the problem of supplying the people with

foodstuffs that are difficult to transport (milk, vegetables, etc.) is becoming more acute. At the same time, the natural and climate conditions of this vast zone make it possible to raise good harvests of potatoes, root crops, vegetables and feed crops. All this makes it possible to develop there the production of many plant-growing products, as well as livestock products--milk and beef.

Under the next five-year plan, scientific institutions will have to work out a special-purpose program of agricultural development of the Near North, BAM [Baykal-Amur Railroad] and northern oil fields.

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Introduction of new highly productive, drought-resistant cultivars and hybrids of agriculture crops that are insusceptible to diseases is helpful in increasing stability of agriculture and strengthening the feed base. Much fruitful work is being done in this direction by scientists at VASKhNIL, breeding centers, scientific production associations. In recent years, several winter wheat cultivars of the intensive type have been developed: Il'ichevka, Odesskaya 51, Severodonskaya, Polukarlikovaya [semidwarf] 49, Odesskaya Polukarlikovaya and Mironovskaya Nizkoroslaya [short]. Some promising cultivars of leguminous, cereal, feed and vegetable crops, potatoes and beets have been developed. Breeding of other crops is being pursued with success. However, we are still faced with many complex and unsolved problems in the area of breeding and seed growing.

Large areas are still covered with unzoned cultivars. It is imperative to develop cultivars for each region, which would undoubtedly increase stability of production. It is very important to accelerate breeding of special cultivars of winter and spring wheat that would be suitable for the nonirrigated and irrigated regions of the Ukraine, Povolzh'ye and other areas. Concentration on one cultivar, even the most universal one, could lead to adverse consequences. This is graphically illustrated by the history of the cultivars Avrora and Kavkaz, which lost their resistance to brown rust [Puccinia] in 1973, and this led to a substantial shortfall of harvest over many areas.

We are also alarmed by the fact that smut fungi have been developing on grain crops in recent years. In this regard, breeding for immunity is acquiring special importance.

There are many unsolved problems in the system of introducing new and valuable cultivars. Refinement of strain testing and reproduction of seeds of new cultivars is a realistic means of accelerating significantly their introduction into production. In this respect, the example of Donetskiy 6 barley cultivar is graphic: at the time it was zoned, there was a total replacement of cultivars in Donetskaya Oblast thanks to the

active efforts of breeders and plant growers at the experimental station. But this problems must not be solved solely through the activity and enthusiasm of some scientists and teams. here, a better system is needed for evaluation, reproduction and introduction of new cultivars.

Progressive technology is one of the decisive factors for success of measures to increase stability of agriculture, and we refer to the entire set of jobs: soil treatment, system of fertilizers, retention of moisture, selection of cultivars, plant care and protection against pests, diseases and weeds, harvesting, transportation, processing and storage of products.

There is a water shortage in most agricultural regions of our country. For this reason, it is very important to accumulate, preserve and make conservative use of water. To retain moisture and prevent soil erosion, it is very important to treat the soil. These matters were discussed at conferences in the Ukraine, Stavropol', Povolzh'ye and other regions.

A conference in Kiev has examined the question of using a system of nonterracing soil treatment in the Ukraine, which was developed by the staff of the All-Union Institute of the Grain Industry, under the supervision of A. I. Barayev, academician of VASKhNIL and Hero of Socialist Labor. This is the most effective of all systems in the dry and erosion-prone regions of Kazakhstan and West Siberia.

However, in view of the fact that not only grain and grass crops, but a number of row and industrial crops are raised in the Ukraine and North Caucasus, terraced plowing is necessary. For this reason, without setting one system against another, scientists must finish in the next few years production tests, and they must prepare zonal recommendations for alternation of terraced, flat-cutting and superficial systems of plowing. Specialists must adopt a creative approach to the choice of soil treatment methods with due consideration of soil, climate and weather conditions. In the Ukraine and Moldavia, many farms are already making rather effective use of plowing to different depths, preparing early fall-plowed fields, semifallow and superficial plowing for winter crops. At a conference in Stavropol', the paper of Academician A. A. Nikonov of VASKhNIL and subsequent ones devoted much attention to questions of improving the system of soil treatment, protection against wind and water erosion, as well as preservation and accumulation of moisture. This problem is of global significance, since we are ultimately dealing with preservation of the foundation of all agriculture, the soil.

Erosion always starts where the soil is dry, hard and powdery. Intensification of agriculture, plowing of all areas, particularly on slopes and light soil, repeated treatment thereof and an increase in load per unit pasture area are instrumental in these processes and accelerate them. To prevent this from happening, intensification must be associated with appropriate changes in organization of technology of agriculture. In each

region, a set of measures should be used to prevent erosion, with due consideration of local features, including organizational, biological, agrotechnical, hydrotechnical, forest-reclaiming and other measures. The most important and available are agrotechnical measures: soil treatment with preservation of stubble, arrangement of crops in strips, converting severely eroded areas and slopes into meadows, treatment in horizontal layers, snow fences, slit trenching, hole digging and furrowing. These procedures have shown a high effectiveness in many farms of our country; however, they are still not being used widely enough. At the same time, according to the data of scientific research institutions and leading farms, only flat-cut plowing in steppe regions can result in holding 30-40 mm more moisture than terracing. Preservation of stubble and snow fences diminish soil freezing and increase grain crop harvest by 3-5 q/ha. Slot fallow is also effective.

In order to provide water for plants, it is imperative to plow the soil at an early time and to regulate drainage of snow melt. According to the data of scientific research institutions in Povolzh'ye, regulation of drainage of snow melt increases the harvest of spring wheat by 15-20%.

The time of main cultivation of soil also has a substantial influence on accumulation of moisture. Early cultivation makes it possible to store 45-60 mm more moisture than late cultivation. Studies have shown that deep fall plowing (28-30 cm) in the zone of brown [chestnut] soil and leached chernozem is very effective once every 3 years, and in chernozem soil once every 3-5 years. Thus, intensification of agriculture has made it necessary to revise basically the technology and systems of agriculture that are used. In areas with unstable precipitation, only a soil-protective system of cultivation guarantees stability of agricultural production.

For stable agriculture, one needs, first of all, a scientifically substantiated system of fertilizers. Fertilizers not only increase the harvest and improve its quality, they also increase plant resistance to adverse weather conditions, they aid in economic use of water per unit production and ultimately are the most important factor of intensification of agricultural production. Thus, according to the data of the All-Union Scientific Research Institute of Corn, there was a particularly distinct manifestation of the effect of fertilizers in the steppe zone in 1979, when the winter was extremely rigorous and there was an acute drought in the spring and summer. For example, 88% of the plants were preserved at the start of spring vegetation on winter wheat fields where phosphorus and potassium fertilizers ($P_{120}K_{120}$) were used in the fall, and 22% less on plots without fertilizers. Bearing these and other convincing data in mind, with regard to the high efficacy of fertilizers in the dry regions of our country, we must, unfortunately, state that in the areas of predominant grain production, agriculture is being practiced with a great shortage of main nutrients. This shortage will persist in the near future; for this reason, scientists and producers are confronted with the task of

increasing the efficacy of the fertilizers used, in the first place, and to use all the reserves to increase the stockpile of organic fertilizers.

Sophisticated agriculture, adherence to progressive technological practices and use thereof in the optimum proportion are very important to increasing the efficacy of fertilizers. The chemical industry most solve many problems pertaining to improving the quality of produced fertilizers.

Agricultural machine building must implement accelerated delivery of modern and highly productive machines for the transport and application of fertilizers. At the present time, availability of equipment for the latter constitutes 66.3%. Unfortunately, we still do not have heavy equipment with the permissible specific pressure to be applied to soil, and there are absolutely no machines for local application of fertilizers. The quality of spreading fertilizers with the existing equipment is not satisfactory (nonuniformity constitutes up to 70-80%, whereas in several other countries it does not exceed 15%).

There are also many unsolved problems with respect to mechanized application of organic fertilizers. In view of the manpower shortage that has developed in many rural areas, one cannot expand the use of organic fertilizers without organizing a system of equipment to remove, store, load and apply manure. At the same time, fuller use of the existing reserves would be quite effective. Thus, use of 20-30 tons/ha manure on winter wheat yields an additional 8-20 q/ha grain, depending on climate conditions.

The scientists of VASKhNIL, who summarized and analyzed the results of research and progressive knowhow in October 1979, demonstrated that implementation of the suggestions of scientists to increase the effectiveness of using mineral fertilizers in our country would make it possible to obtain an additional 18-20 million tons of grain.

The role of fertilizers is particularly great in reclaimed territories. Reclamation of land, particularly irrigation, in our harsh and unstable climate is a most important factor in stable agriculture. In the years that have passed since the May (1966) plenum of the CC CPSU, enormous work has been done in our country to develop reclamation. The area of irrigated land has grown. There have been radical changes in technological support of reclamation systems.

Drying and watering systems for different soil and climate conditions, with the use of closed and vertical drainage, are gaining increasing use. They are particularly important in areas where drought alternates with periodic excessive precipitation (Belorussia, northern regions of the Ukraine, Baltic region, nonchernozem regions of Russia, etc.). Scientists have proposed systems of synchronous pulsed sprinkling. There are plans to expand considerably the use of this promising watering method.

At the same time, the productivity of irrigated land is still low. The main causes are disruptions of schedules for watering and, fertilizing, unsatisfactory use of irrigation technology, mistakes in planning irrigation systems, as well as insufficient consideration of soil conditions.

In view of the expansion of irrigation, increased use of water for industrial and public needs, scientists must solve a number of complex problems pertaining to conservation of water and increasing efficacy of its use. At the present time, inadequate use is made of the possibilities of drowned estuary ["liman"] irrigation, which does not require much capital investment and, at the same time, is very effective. A significant part of the limans are in a very neglected condition. Proper use of existing areas of liman irrigation and utilization of new such areas could increase appreciably the harvest of feed crops. For example, in Kazakhstan, hay was mowed over 13.7 million ha, only 0.79 million of which, or 5.7%, consisted of liman irrigated land, but the latter yielded 43% of the hay. The mean yield of hay in limans constituted 22.8 q/ha, versus 1.8 q/ha in the natural hay fields.

Windbreaks of timber play a part in the set of measures that attenuate, to a significant extent, the devastating effects of wind and water erosion of the soil, drought and hot, dry winds. According to the data of the Department of Forest and Land Improvement of VASKhNIL, there was an increase in harvests of all crops, with stable agricultural and livestock production under different natural conditions at many farms that have systems of forest windbreaks. In the European part of our country, such windbreaking strips of timber had a substantial effect on increasing the harvest in the dry years of 1972, 1975 and 1979.

With reference to the set of measures for conservation and accumulation of water, we cannot fail to mention the control of weeds. The sophistication of agriculture depends on extent of weed infestation. The farmers of Northern Caucasus and, particularly, Kuban' are well-aware of this. There, a nation-wide war is being waged for clean fields, and some good practical results have been obtained. And this is justified. Even when there are not too many weeds, they remove about 25 kg nitrogen, 10 kg phosphorus and 30 kg potassium, or a total of 65 kg, from every hectare; in the case of average weed infestation, the total removal of nutrients constitutes over 100 kg, i.e., more than we add with fertilizers per hectare of tilled land in the nation. For this reason, weed control is a most important element of proper agriculture. The loss caused by weeds, pests and diseases of agricultural crops exceeds 30% of total agricultural production per year. Extreme weather and climate often add to this loss, since they weaken crop resistance, particularly to pests and diseases.

Highly sophisticated agriculture, one of the main agrotechnical elements of which is the practice of crop rotation, is the ecological basis for the protection of plants. Alternation of crops in the fields, which is

associated with different methods and times of tilling, prevents the reproduction of wireworms, wheat beetles, grain thrips, rustic shoulder-knot moths and other dangerous pests, and it plays a large role in preventing sunflower diseases and root rot in grain crops. The introduction of cotton and alfalfa crop rotation in Central Asia, which was developed by scientists for all cotton-growing areas, increased the yield of raw cotton by 8-10 q/ha. The incidence of wilt decreased at the farms where cotton and alfalfa crop rotations were used.

Integrated systems of control, combining all methods, including chemical and biological, with due consideration of the economic thresholds of deleteriousness of diseases and pests, have not been adequately developed and are slow in being adopted. Unquestionably, implementation of measures to protect plants will help increase the stability of agriculture.

Cultivation of green plants is the foundation of all agricultural production. Only they have the capacity to utilize the radiant energy of the sun and to produce, from the inorganic substances in air and soil, new organic substances that are the source of food and energy for man, animals and microorganisms.

K. Marx, F. Engels and V. I. Lenin repeatedly indicated that agricultural plants that are raised by farms, involved in economic and other social relations, are not only the object, but the tool of labor. As the object of labor they are subject to the actions of the farmers; as the tool of labor, they not only transform nature, but have a strong influence on development of social relations. Rating highly the role of cultivars, fertilizers, crop rotation and intensification of agriculture, V. I. Lenin believed, however, that farming technology is the decisive element of productive forces. "The limitation of productive forces of the land amounts ..." to 'limitation' of that level of technology, that state of productive forces" (V. I. Lenin, "Complete Works," Vol 5, p 114).

Governed by these theses, the Communist Party of the Soviet Union and the Soviet people have really revolutionized the technological rearmament of agriculture in our country in the years of Soviet power.

Mechanization and electrification play a very important part in improving the effectiveness and stability of agriculture. The enormous growth in number and virtually complete qualitative change in the fleet of equipment played a large part in obtaining 179 million tons of grain during the difficult year of 1979. The increase in supply of equipment resulted in a reduction in time of performance of work, growth in yield of crops and reduction of direct labor expenses per unit production.

However, the growth in volume of production does not conform with the potential capabilities of its technical base, which also requires considerable improvement. Introduction of new industrial technology implies the use of modern, reliable, highly productive equipment that would assure

a high quality of work. Unfortunately, the system of machines developed by scientists and tested in practice is being slowly assimilated by industry. In 1976-1978, less than 30% of the new equipment included in this system was delivered to agriculture. At the same time, a number of obsolete models is being manufactured. The quality of many of the machines that are used in rural areas is poor, and a high price is paid for this. Thus, according to tentative estimates, grain loss solely as a result of deficient harvesting equipment, shortage of machines and, particularly, vehicles, as well as stretching out harvesting time, constitutes 20-30 million tons.

The Central Committee of the CPSU and comrade Leonid Il'ich Brezhnev personally have called the most serious attention of party and soviet bodies, scientists and specialists to the need for increasing the effectiveness of using the technological potential, faster development and introduction of new machines and equipment. Solving problems pertaining to complex mechanization of cultivation of all of the most important agricultural crops is closely linked with the training and use of skilled machine operators. The seasonal shortage of machine operators constitutes about one million people nationwide. One of the main reasons for this is personnel turnover. This is due, first of all, to the inconsistency between working and social living conditions in rural areas, on the one hand, and the requirements of modern rural workers, particularly young people, on the other.

The present scientific-technological and economic potential of our country makes it possible to reduce substantially the adverse effects of deleterious factors and provide for stable development of agriculture. At the same time, development, creation and introduction of any procedures, even the most effective ones, to increase stability of agriculture, such as new cultivars, equipment, fertilizers, pesticides and irrigation, cannot be successful if they are used in an uncoordinated manner, outside a system. In order to attain the ultimate goal, that of a stable supply of foodstuffs for the public and raw material for industry, a systemic approach is required, with consideration of all the complexity and diversity of agricultural production, covering biological, technical, technological, organizational, economic and social aspects.

The first attempt at the development of such a program was the publication by VASKhNIL scientists of works dealing with zonal systems of agricultural management in the second half of the 1960's. In some regions, this work had positive results; it helped agricultural managers and specialists to define interoblast, interfarm and intrafarm specialization, to select crops and cultivars suitable for local conditions, to develop different branches of the livestock industry, etc.

At the present time, the scientists of VASKhNIL, together with party, soviet and agricultural agencies, are working on different variants of rural development in all parts of our country, on the example of specific

oblasts, rayons and farms. Proper use of economic and social levers is a most important factor in development of agriculture. As repeatedly stressed by comrade Leonid Il'ich Brezhnev, long-range planning of agricultural development requires further refinement. It is imperative to intensify the social orientation of these plans. They must reflect the entire set of measures in the area of social development. Scientists should develop a new system of planning indicators, that best reflect the quality of work and end results, which meet social needs, with due consideration of modern conditions. Cost accounting is still not being practiced adequately. For example, the procedures for distributing profits and establishing economic incentive funds, organization and disbursement of wages, formation of prices for industrial and agricultural products, as well as purchasing prices, are still far from perfect. Scientists-economists must develop a better economic mechanism and system of controlling agriculture, since the existing ones do not provide for effective solutions of problems confronting this industry, due to departmentalism, deficient planning and material incentives.

In view of the demands made of agriculture, as well as the demographic situation in our country, scientists must prepare proposals to upgrade interregional and interoblast specialization of production and industrialization of labor in agriculture, as well as drastic increase in its productivity. In the immediate future, it will be necessary to triple labor productivity in agriculture, as compared to 1978. This can be achieved, first of all, by creating new industrial technology and equipment, by correctly locating production and significantly increasing productivity of plant growing and animal husbandry.

As stressed by comrade L. I. Brezhnev at the November (1979) plenum of the CC CPSU, reduction of production losses at all stages is an important reserve for stability of agriculture, referring to production, transportation, storage, processing and selling. Problems of preserving production should become an inseparable element of complex special-purpose research programs, projects and introduction of the results thereof into practice.

At the present time, agricultural science has a powerful potential. There are tens of thousands of highly skilled scientists, who conduct research in all directions of development of agriculture, who work in the system of the USSR Ministry of Agriculture, VASKhNIL, a number of ministries and agencies in the agrarian-industrial complex. Of course, the scientific potential that has been formed is not yet being utilized effectively enough. But we could do much more, if we were to use more fully our reserves, eliminate duplication and involvement with trivial projects, better organization of the research process, if we were to intensify collaboration among different specialists and provide a systemic approach to the solution of pressing production problems.

[587-10,657]

10,657
CSO: 1840

DECREE ADOPTED BY THE SESSION OF THE ALL-UNION ACADEMY OF AGRICULTURAL SCIENCES IMENI V. I. LENIN (MOSCOW, 11-12 MARCH 1980): 'MEANS OF INCREASING PRODUCTION OF GRAIN AND FEED, IMPROVING EFFECTIVENESS AND STABILITY OF AGRICULTURE'

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 16-19

[Article]

[Text] The long-range program of the party, which provides for systematic and comprehensive intensification of agricultural production by means of its specialization and concentration, broad use of chemistry, reclamation of land, mechanization of farming and animal husbandry, and introduction of advances in science and progressive practice, is being successfully implemented in accordance with the decisions of the March (1965) plenum of the CC CPSU, 25th CPSU Congress and subsequent plenums of the CC CPSU, as well as the instructions of comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the presidium of the USSR Supreme Council. A wide program is being followed to strengthen the material and technical base of agriculture, and organization of agricultural production is being refined. There is a constant increase in deliveries to kolkhozes and sovkhozes of tractors, combines and other farm machinery, tools, fertilizers and agents for the protection of plants. The areas of irrigated and dried land are growing.

Intensification of agricultural production, creation of a firm material and technical base, high degree of organization and the great work of agricultural workers have made it possible to bring up the gross mean annual grain harvest to 209 million tons in 4 of the years under the 10th Five-Year Plan, which is almost 27 million tons more than under the 9th Five-Year Plan. Positive results have also been obtained for other crops and in the livestock industry.

Agricultural science played a major role in the successive development of agriculture and increased stability thereof. Many procedures and methods of agricultural management have been put into practice on the basis of scientific advances and technology, which were theoretically substantiated. Progressive systems of working the soil, fertilizers and crop rotation have been offered to this industry, which increase fertility of soil, protect it from water and wind erosion, aid in increasing productivity, as

well as reduce labor and expenditure of material resources. Several practical procedures were developed to regulate the cycle of substances in the "soil--climate--fertilizer--plant" system, directed toward successive increase in soil fertility under conditions of specialization and concentration of production, highly effective use of fertilizers, which provide for an increase in stability of farming, growth of harvests of agricultural crops, improved quality of products and protection of the environment.

A soil-protective system of agriculture is being successfully adopted, and it provides for effective control of wind erosion, retention of water in soil and large, stable harvests of grain crops, particularly wheat, in regions of Siberia, North Kazakhstan and other steppe regions of our country.

Breeders have developed a number of new winter wheat cultivars with a potential productivity of 80-100q/ha [quintals/hectare] or more, good flour milling and baking qualities of grain, as well as highly productive intensive spring wheat, winter and spring barley, winter rye and oat cultivars, industrial, vegetable and other crops.

A set of measures was elaborated and is in wide use to protect plants against pests, diseases and weeds.

Industrial technology is being introduced to raise corn, sunflowers, soybeans, sugar beets, common flax and other crops, which assure large and stable harvests with minimal expenditure of manual labor.

Technically more refined irrigation and drainage systems have been developed, with highly productive irrigation methods, new designs of water-collecting installations to irrigate desert pastures, new methods of regulating moisture in soil in the humid zone, with the use of vertical drainage.

In spite of the definite advances made in farming and plant growing, the level of production of grain, feed and other products still fails to satisfy the nation's growing needs.

Intensive use of reclaimed [developed] land, liming of acid soil and gypsum treatment of solonets [alkaline soil] provide a large reserve for increasing production of grain, feed and other products. However, lime treatment of acid soil is not being performed fast enough, and often without adhering to the established technology. The main technology for reclaiming land is also not followed, as a result of which the harvest diminishes and there is a shortfall in delivery to the nation of agricultural products. The structure of grain fields requires considerable improvement in a number of regions.

Soil-protective technology is slow in being introduced; there is impairment of the structure of fields and crop rotations, with underestimation of the role of bare fallow when there is not enough water; full advantage is

not being taken of agents that protect plants to augment productivity. There are serious flaws in the area of development and introduction into practice of progressive methods of economic incentives for agricultural and livestock production. The new highly productive cultivars developed by breeders are slowly being introduced into agricultural practice. There are unwarranted lags in changing cultivars [strains]. There are major flaws in organization of seed growing and setting it up on an industrial basis. There are still great losses when harvesting grain and other agricultural products.

There are also flaws in the use of equipment, fertilizers and other material and technical resources. There are instances of unrational use of land resources and digression from the plans for intrafarm land management.

The following problems in the field of agriculture are being solved too slowly:

> Theoretical bases and practical procedures of industrial technology for raising grain, feed and a number of other crops, that would provide the most rational use of all energy and labor resources in the production process
>
> Complex regional systems of farming, consistent with both local conditions and modern tendencies in scientific and technological progress
>
> Effective systems of dry farming, providing for economical and most rational use of moisture in soil and stable, high harvests under extreme weather conditions
>
> Methods of complex regulation of the main vital factors for cultivars raised on reclaimed land
>
> Theoretical bases of mineral nutrition of plants with formation of high yields and improvement of quality of agricultural products under conditions of intensive farming
>
> New technology for application of fertilizers in different soil and climate regions, combined with progressive agrotechnology, raising intensive cultivars, using chemical and biological agents for the protection of plants, new irrigation methods that help obtain a biologically valuable harvest
>
> Refinement of methods of experimental research based on the use of mathematical methods and computers to determine the correlation between harvest and its qualitative parameters, on the one hand, and soil fertility, doses and types of fertilizers, distinctions of cultivars and climate factors, on the other.

As it continues to head toward comprehensive intensification of agriculture, the Party deems the increase in product quality to be among the first and foremost objectives, along with increased output.

In the light of the tasks spelled out by the July (1978) and November (1979) plenums of the CC CPSU, there is still much work in store for scientific research institutions and agricultural VUZ's in the area of expanding and deepening scientific research, as well as continuing to strengthen the ties between science and industry. The droughts that are frequent in the main areas of commercial production of grain and other agricultural products raise a number of problems that require immediate solution by scientific institutions and scientists.

This session of the ALL-Union Academy of Agricultural Sciences imeni V. I. Lenin [VASKhNIL] hereby resolves:

1. To approve, with due consideration of comments and suggestions, the recommendations elaborated by scientific research institutions of VASKhNIL and ministries of agriculture of the USSR and Union republics, which were examined at zonal scientific-industrial conferences in the main regions of the nation, dealing with increase in production of grain, feed and other crops, improvement of effectiveness and stability of agriculture in regions of the Ukraine and Moldavia, North Caucasus, Povolzh'ye and Orenburgskaya Oblast, Belorussia, Lithuania, Latvia and Estonia, the central chernozem oblasts, West Siberia and Transurals, East Siberia and the Far East.

2. To instruct the presidium of VASKhNIL, together with representatives of pertinent regional departments, to finalize these recommendations within 2 weeks, with due consideration of comments voiced, and to transmit them for publication to the USSR Ministry of Agriculture.

3. To observe that these recommendations are the foundation for elaboration by the farms of specific measures to increase production of grain, feed and other crops, improve effectiveness and stability of agriculture. Scientific research institutions are to participate more actively in publicizing and implementing the developed recommendations.

4. The presidium, sectorial and regional departments of VASKhNIL are to implement development of theoretical and applied research directed toward development of new ways and means, as well as refinement of existing ones, for increasing soil fertility and productivity of agricultural crops, increasing production of grain, feed and other crops. To this end, the following must be done with the participation of institutes of the USSR Academy of Sciences, academies of the different republics and other agencies:

Continued development of complex research on problems of improving the effectiveness and stability of agricultural production

Development of basic research on problems of expanded reproduction of soil fertility, determination of optimum parameters of hydrothermal,

physical, physicochemical, chemical and biological properties of soil in different climate zones, that permit taking full advantage of the potentials of highly productive cultivars of the intensive type

Development of intensive soil-protective systems of farming in zones of the nation, as well as effective procedures for accumulating, conserving and making rational use of moisture in soil, particularly in areas of dry farming; development of optimum phytoclimate in different parts of the country in order to obtain maximum harvests of the farmed crops

Development of effective ameliorative procedures for two-way regulation of soil water balance

Development and refinement of industrial technology for raising agricultural crops with reduction of energy and labor expenditures per unit product, including optimum parameters of nutrient, water, salt, air and temperature conditions, density and other properties of soil, minimizing tractor and sowing machine runs, direct planting with due consideration of specific distinctions of the crops

Study of ecological consequences of intensification of agricultural production, and development of measures to prevent the possible adverse effects on the biosphere

In-depth basic research in the area of agrometeorology and allied disciplines, directed toward development of methods for high-quality forecasting of weather conditions and deleterious effects of natural factors on the crops

Refinement and development of basically new methods of gathering and processing information about the condition of crops, agroclimatic phenomena and processes, composition of soil and crops, use of land resources, status of reclamation systems, etc., based on automated, visual and instrument observation methods, paying special attention to the use of aerospace methods of studying agricultural resources

In-depth theoretical research in the area of plant nutrition under conditions of intensive agriculture, wide use of new and highly productive cultivars and industrial technology to raise them

Development of research directed toward upgrading the economic mechanism and methods of providing incentives for improving stability and effectiveness of agriculture

5. Sectorial and regional departments of VASKhNIL, administrators of leading scientific research institutes that serve as coordinators, as well as administrators of co-executor institutes must implement preparation of programs for scientific research in 1981-1885, including the most pressing

problems of protecting soil against erosion, improving the effectiveness and stability of agriculture. They must assure unconditional implementation in 1980 of State and departmental plans pertaining to the solution of scientific and technological problems in the areas of agriculture, water and forest management, to increase the effectiveness of scientific research, paying special attention to the following matters:

Improvement of location, specialization and concentration of agricultural production, structure of farmed areas in different regions of our country for the purpose of more rational utilization of land, water, material and labor resrouces, as well as the overall economic and biological potential

Scientific substantiation of alternation of crops to assure increase in soil fertility in each crop rotation field and growth of effectiveness of factors of productivity of crops raised, fertilizers, soil treatment, use of highly productive cultivars, herbicides, etc.

Development of ways and means of increasing productivity of plowed fields, hay fields and pastures, achieving maximum yield from farmed crops in each hectare of land with the least financial and labor expenditures

Development of effective measures to protect soil against water and wind erosion, zonal soil-protective systems of farming that would provide expanded reproduction of soil fertility and augment the yield from agricultural crops

Development of a system of crop rotations of the intensive type, which would permit harvesting additional products planted repeatedly in the south of European USSR from two harvests per year in irrigated areas

Increased effectiveness of using reclaimed land, as a result of rational technology of raising crops, progressive forms of organization of labor, material and spiritual incentives, concentration and specialization of farming in irrigated and drained areas

Development of the most efficient methods of irrigation, more sophisticated and highly productive machinery that would provide for a high quality of irrigation, economical use of water, reduction of loss thereof due to filtration and evaporation

Development of progressive procedures for providing optimum salt content in irrigated soil, prevention of secondary salination of land during watering, as well as more sophisticated methods of reclaiming and developing solonets [alkaline soil areas].

Further increase in effectiveness of breeding work to create new, highly productive and high-grade cultivars that are resistant to diseases and pests, responsive to increased doses of fertilizers and more resistant

to adverse environmental factors, meet modern requirements of highly mechanized agricultural production. Intensification of research directed toward refinement of agricultural crop seed growing, organization of accelerated reproduction of new, more productive cultivars and introduction thereof into production

Refinement of the system of farm machinery and tools to protect soil against water and wind erosion, development of more sophisticated machines to apply fertilizers, till the soil, sow and care for crops on sloped and irrigated land, including the following:

Development of highly productive grain harvesting, feed gathering, grain cleaning and grain drying complexes operating under difficult weather conditions

Development of new designs of farm tractors, to be hitched with combined machines and units equipped with propulsion systems that have a minimal effect on the soil and that are functional when moisture of soil is high

Development of automatic dev'ces for optimum control of technological mode of treating soil, crops, crop care, harvesting and postharvesting processing of crops in accordance with environmental conditions

Use of low-potential heat discharge from electric power stations and heat of geothermal water in technological plant-growing processes

Expansion of research on effective use of mineral and organic fertilizers in nonterraced tilling; conducting multifactor experiments in order to provide better recommendations in this area

Continued refinement of ways and means of controlling diseases, pests and weeds; development of effective and reliable methods of forecasting their development and deleteriousness, in order to improve the safety of plant protection procedures to the biosphere, maximum preservation of harvest and improved quality of products

Expansion of research on the problem of strengthening and developing the feed base of agriculture on the following basis:

Improvement of structure of feed crop rotation, improvement of natural feed resources, particularly tidal meadows; establishment of highly productive meadow and pasture management, and wide development of irrigated pastures

Intensification of work to develop new, highly productive strains of feed crops with increased seed productivity, particularly to improve breeding of perennial leguminous and graminous grasses, with due consideration of zonal conditions

Introduction of new technology for the production and processing of feed and seeds of perennial grasses, wide introduction of such crops as soybeans, rape, lupine and leguminous plants; organization of specialized sectors to raise seeds of perennial grasses on the basis of interfarm cooperation, primarily for the production of alfalfa and clover seeds in the aspect of inter-republic relations

Complex mechanization of all processes of production, processing, storage and use of feed

In-depth research on protective [windbreak?] forestation

Continued development of effective measures to protect the environment, make rational use of natural resources, particularly, land resources, as well as for scientifically substantiated location of agricultural crops in different parts of our country.

6. Charge the regional departments of VASKhNIL to make use of the resources of scientific research institutions in each region to work on upgrading systems of agriculture, as well as systems of farm management, with due consideration of the need to improve effectiveness and stability of production.

* * *

The participants at the session of the VASKhNIL appealed to the personnel of scientific institutions to celebrate in a worthy manner the 110th anniversary of the birthday of V. I. Lenin: to assure implementation in 1980 of the plans for research work, as well as socialist obligations; to render every assistance to kolkhozes and sovkhozes with regard to learning and using the achievements of science and progressive knowhow, attaining, together with rural workers, stable agricultural production and a significant improvement of its effectiveness.

[587-10,657]

10,657
CSO: 1840

DECREE ADOPTED BY THE ANNUAL GENERAL MEETING OF ACTIVE MEMBERS (ACADEMICIANS) AND CORRESPONDING MEMBERS OF THE ALL-UNION ACADEMY OF AGRICULTURAL SCIENCES IMENI V. I. LENIN: 'MAIN ACHIEVEMENTS OF THE ALL-UNION ACADEMY OF AGRICULTURAL SCIENCES IMENI V. I. LENIN IN 1979, AND OBJECTIVES OF FINISHING WORK ON THE MOST IMPORTANT SCIENTIFIC AND TECHNOLOGICAL PROBLEMS OF AGRICULTURE AS STIPULATED IN THE TENTH FIVE-YEAR PLAN' (MOSCOW, 14 MARCH 1980)

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 20-22

[Article]

[Text] In 1979, the workers of our country achieved further growth of national production in implementation of the decisions of the 25th CPSU Congress. The material and cultural standard of living continued to rise on this basis.

Backed up by the increased material and technical base, kolkhoz and sovkhoz workers obtained a 10 billion ruble increase in the gross agricultural product in 1979, as compared to the annual average in 1971-1975.

Discussing the report on the performance of the academy in 1979, the General Annual Meeting of active members (academicians) and corresponding members of VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] observes that the presidium, sectorial and regional departments of the academy, scientists and specialists at scientific research institutions of VASKhNIL have obtained appreciable achievements pertaining to work on the most important scientific and technological problems of agriculture in implementation of the decisions of the 25th CPSU Congress, guided by the decisions of the July (1978) and November (1979) plenums of the CC CPSU, decrees adopted by the CC CPSU and USSR Council of Ministers pertaining to agricultural science and production, as well as the instructions of comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the presidium of the USSR Supreme Soviet, and implementing the plans for scientific research work under the 10th Five-Year Plan.

The presidium of the academy, sectorial and regional departments are working on implementation of decree No 703 adopted by the CC CPSU and USSR Council of Ministers: "On Measures for Continued Improvement of Effectiveness of Agricultural Science and Strengthening Its Ties With Production." The

attention of the staff of departments and institutes is concentrated on intensifying collaboration ["complexity"] in research, solving large and long-term problems of agricultural science and production, combining basic and applied research, and accelerating introduction of scientific achievements into production. Attention is given mainly to the need to improve the effectiveness and quality of research, increasing responsibility of institutes, departments, laboratories and each scientist for the results of research and recommendations to agriculture.

Together with the institutes, the academy exerted a more active influence on development of the main sectors of agriculture; it was concerned more meaningfully and deeply with major scientific-theoretical and scientific-production problems. At meetings of the presidium, along with long-term programs of scientific research on the most important problems of agricultural science, there was active discussion of the results of research, scientific methodological, scientific organizational and scientific industrial problems (location of agricultural production; increasing production of grain, feed, industrial crops; increasing stability and effectiveness of agriculture; development of the livestock industry; loss prevention and storage of agricultural products; economic conditions of farm management; questions of material and technical support of institutes, etc.).

The tangible, constant and active link with industry, in-depth scientific analysis of the status and prospects of development of its different sectors enabled the presidium of VASKhNIL, together with sectorial institutes, to submit a number of suggestions to management bodies pertaining to key problems of agriculture: development of grain farming, increase in production of feed, corn, sunflowers, sugar beets, cotton; increased effectiveness in using irrigated land and fertilizers; structure of cultivated areas; soil-protective system of farming; development and increase in productivity of the livestock industry; mechanization, electrification, acceleration of scientific and technological progress in agriculture, etc.

Long-term plans have been elaborated for research in the main directions of development of agricultural science under the 11th Five-Year Plan and up to 1990, which call for significant elevation of the scientific and methodological level and effectiveness of research, as well as introduction into practice of completed projects.

The presidium devoted much attention to strengthening administrative personnel of scientific institutions and advanced training of researchers.

At the present there are 125 institutes and over 150 experimental stations in the system of VASKhNIL, which enabled the academy to expand significantly scientific research and to strengthen ties with industry.

The presidium of the academy implemented the following in the reported year: scientific sessions on "Scientific Problems for Continued Development of Agriculture in Siberia and the Far East" (Novosibirsk), "Acceleration of

Scientific and Technological Progress in the Areas of Mechanization, Electrification and Automation of Agriculture" and the jubilee session of the academy in celebration of the 50th anniversary of the foundation of VASKhNIL (Moscow); it also prepared and convened seven zonal scientific-industrial meetings and sessions of VASKhNIL dealing with increase in grain and feed production, improvement of effectiveness and stability of agriculture.

There was continued strengthening of ties between VASKhNIL institutes and institutes of the USSR and Union republic academies of sciences. The scientists of the USSR Academy of Sciences and VASKhNIL, academies of sciences of Union republics, USSR Ministry of Agriculture, USSR Ministry of Higher and Specialized Secondary Education, other ministries and agencies elaborated programs of joint scientific research on the most pressing problems of agricultural science for 1981-185, in accordance with the decree, "Science to Serve Agriculture," adopted by the general meeting of the USSR Academy of Sciences.

There is collaboration between institutes of VASKhNIL and scientific institutions in 32 countries.

In spite of the exceptionally difficult weather conditions in 1979, the personnel of the academy's experimental farms did much work to reduce the adverse effects of drought and increase to a maximum the output of plant growing and animal husbandry, as well as to implement the plans for selling agricultural products to the state. The exhibit on "Agricultural Science Serving the Industry," dedicated to the 50th anniversary of VASKhNIL, which was arranged at the Exhibition of Achievements of the National Economy of the USSR, was very important in publicizing and introducing scientific advances.

In the All-Union socialist competition of 1979, 10 scientific research institutions and 7 experimental farms of the academy were awarded the challenge red banners of the CC CPSU, USSR Council of Ministers, AUCCTU and CC of the Komsomol (All-Union Scientific Research Institute of the Grain Industry, Mironov Scientific Research Institute of Wheat Breeding and Seed Growing, All-Union Scientific Research Institute of Rice, All-Union Scientific Research Institute of Agricultural Mechanization; Kuybyshev, Siberian, Bashkir, Ural, Krasnodar imeni N. O. Luk'yanenko and Don zonal scientific research institutes of agriculture. The following experimental farms: Volna Revolyutsii of the All-Union Scientific Research Institute of Fertilizers and Soil Science; Timiryazevskoye of the South Ural Scientific Research Institute of Agriculture; that of the Scientific Research Institute of Agriculture of the South East; Zavety Lenina of the All-Russian Scientific Research Institute of Agricultural Use of Reclaimed Land; State Agricultural Experimental Station of Komi ASSR; Minskoye experimental farm of the Kostromskaya Oblast State Experimental Agricultural Station; Rassvet of the North Caucasus Scientific Research Institute of Animal Husbandry).

At the same time, the Annual General Meeting of VASKhNIL observes that there are substantial flaws in the work of the academy and its institutes. The scope and depth of research on several directions of utmost importance are still behind the increasing practical demands. The effectiveness and level of scientific projects at several academy institutes still fail to meet the requirements of the present stage of scientific and technological progress.

Not enough research is being done on development of better zonal systems of management of agriculture, which would diminish the deleterious effects of adverse weather conditions and assure high stability of grain production, feed base, animal husbandry and other sectors of agriculture.

There is a need for substantial acceleration of work to develop automated irrigation, drainage and watering systems, dual regulation of water table, effective use of water, improvement of heavy soil and others.

It is imperative to take additional steps to increase the effectiveness of breeding work: to develop high-quality, winter-hardy winter wheat strains for the Central Chernozem Belt, early ripening and more productive spring wheat cultivars for Siberia, to develop and implement wide introduction of highly productive, early ripening cultivars and hybrids of corn and sunflowers, as well as of leguminous and feed crops, and particularly feed grasses (alfalfa and clover), including those with increased seed productivity.

There is also a serious lag behind the demands of the industry of scientific research and projects, as well as introduction of effective recommendations to reproduce herds, improve pedigreed breeding work, expedite implementation of the planned capability of livestock complexes, and increased production of feed protein.

There is slow development of machinery and other mechanized equipment for tilling and harvesting vegetable crops and potatoes; complex mechanization of production processes at livestock farms of kolkhozes and sovkhozes is not being introduced adequately.

It is imperative to accelerate and improve the quality of research on specialization and concentration of agriculture, interfarm cooperation and agro-industrial integration, effectiveness of use of fixed capital and capital investments, upgrading organization of production, labor and management at kolkhozes and sovkhozes.

There must be significant improvement of research planning and coordination on all levels of scientific institutions, from the bottom to the top, in order to implement cooperative studies of continued refinement of the system of planning and coordination of scientific research on the regional level.

The annual general meeting of active members (academicians) and corresponding members of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin hereby resolves:

1. To approve the activity and accept the report of the academy's presidium concerning the results of the work done by VASKhNIL in 1979.

2. To instruct the presidium of VASKhNIL, sectorial and regional departments, as well as directors of scientific research institutions under the academy, to implement unconditional performance of measures spelled out in accordance with the decisions of the 25th CPSU Congress, July (1978) plenum of the CC CPSU "On Continued Development of Agriculture in the USSR," and for the performance of research stipulated in the plans for the 10th Five-Year Plan, paying special attention to increasing the effectiveness and improving the quality of scientific research, its end results, novelty and elibigibility for patents of scientific projects, upgrading the forms of contact between science and practice, expediting introduction of scientific advances and progressive knowhow into agriculture.

To have scientists concentrate on development of research in the main directions outlined by the decrees "On Continued Development of Specialization and Concentration of Agriculture on the Basis of Interfarm Cooperation and Agroindustrial Integration" adopted by the CC CPSU, "On Measures for Continued Increase in Effectiveness of Agricultural Science and Strengthening Its Ties With Industry" adopted by the CC CPSU and USSR Council of Ministers, and other decrees adopted by the party and state pertaining to the most important problems of agricultural science and industry.

To develop comprehensively complex [cooperative] research on the main problems of agrarian science and industry. This must include significant expansion of projects worked on jointly with the scientific institutions of the USSR Academy of Sciences, academies of sciences of Union republics, other ministries and agencies, as well as foreign scientific institutions. Each scientist must be made more responsible for his recommendations to industry.

3. The following are to be deemed the most important tasks for active members (academicians), corresponding members of VASKhNIL and all scientific institutions dealing with agriculture: introduction of all innovations and progressive achievements to assure the continuous growth of agricultural and livestock production, to render comprehensive assistance to kolkhozes and sovkhozes in the area of fuller utilization of reserves in this industry and achievements of science, technology and progressive knowhow, in order to expedite scientific and technological progress in agriculture.

4. Administrators of sectorial and regional departments of VASKhNIL must implement special supervision of implementation of decrees adopted at annual meetings of departments. Progress of this work must be examined periodically by the departmental offices (presidium).

Determination must be made of effective means of collaboration of councils and sections of sectorial departments with sections of regional departments.

5. The presidium of VASKhNIL must improve scientific and methodological management of research work in the area of agriculture, water and forest management; it must improve work with scientific personnel. Steps must be taken to further improve the training of young scientific cadres by means of graduate studies, to increase the qualifications of young scientists by means of on-the-job training in laboratories of the leading scientific research institutes of the USSR Academy of Sciences, USSR Ministry of Agriculture and VASKhNIL, as well as institutes under other ministries and agencies; steps must be taken to continue to furnish scientific institutions with the latest modern equipment, instruments and other technical resources, as well as to make more effective use thereof in scientific research.

The administrators of sectorial and regional departments, directors of scientific research institutions and experimental farms of the academy must implement, in accordance with the decisions of the November (1979) plenum of the CC CPSU, broad socialist competitions among worker groups for meeting target dates and good quality of implementation of the plan for scientific research work, successful achievement of personal creative plans of scientists, implementation of plans for agricultural production before the target dates in each experimental farm in 1980 and under the five-year plan as a whole, to convert in the next few years the experimental and testing farms into outstanding, exemplary enterprises capable of serving as the connecting links between science and industry.

The general annual meeting of VASKhNIL has called upon the scientists to celebrate in a worthy fashion a noteworthy occasion, the 110th anniversary of the birthday of V. I. Lenin: to raise the sophistication of scientific research and its results for purposes of continued development of agricultural science and promotion of its role in advancing socialist agriculture; to concentrate their attention on implementation of the decisions of the 25th CPSU Congress, July (1978) and November (1979) plenums of the CC CPSU, the decrees of the CC CPSU and USSR Council of Ministers, instructions of comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the presidium of the USSR Supreme Soviet, pertaining to fuller utilization of all reserves, continued development of labor productivity in our country; to render comprehensive assistance to rural workers with respect to utilization of advances in science, technology and progressive knowhow in order to obtain significant growth of agricultural production and reduction of its cost.

[587-10,657]

10,657
CSO: 1840

EROSION PROBLEMS IN ARMENIA

Moscow IZVESTIYA in Russian 29 Jun 80 p 2

[Article by G. Petrosyan, director of the Scientific Research Institute of Soil Science and Agricultural Chemistry, Armenian SSR: "Farming in the Mountains: Maintaining and Augmenting Soil Fertility"]

[Text] The problem of soil conservation and optimum land use is very acute in Armenia. Nor is this any accident. Whereas in 1953 per capita land area of the republic was 0.43 hectare, it is now down to 0.17 hectare--the republic's population is growing rapidly. We must moreover add that our fields in the mountains are distinguished by small intervals between contour lines. Approximately two-thirds of the plowland located on stony slopes is exposed to the effect of the processes of erosion. The situation is compounded by the fact that Armenia has practically no real reserve of land suitable for plowland which might be put into cultivation without large additional capital investments.

I will speak about this in order to emphasize once again how great is our collective responsibility to future generations for the fate of the land. Unfortunately, we do not always remember this in our everyday practice.

Failure to observe the rules of soil-conserving cultivation, the vertical plowing of slopes, excessive pasturing of livestock, and the low level of soil and crop practices--all this can and frequently does result in the development of erosion.

The activity of construction organizations also does much to favor occurrence of these processes. For example, only several tens of hectares out of the several thousands of worked-out quarries from which building materials have been extracted have been returned to cultivation, and even when done, it has not been done properly. When builders build roads on sharp curves, they pay no attention to reliable reinforcement of the shoulders, and as a consequence the soil washes away at a fast rate, and gullies are formed. Often geologists "forget" to fill in ditches dug on sloping terrain, a few years pass, and the ditches turn into the beds of torrents. Municipal organizations often ask farm directors to cut sod and deliver it

for landscaping squares. When they remove the protective layer of the soil, they do not realize that they are condemning it to further destruction.

That is the briefest presentation of the factors favoring development of the processes of erosion in the republic. And what does science propose?

Experiments run over more than 10 years by our institute have established the beneficial effect in terms of soil erosion prevention of deep one-sided horizontal plowing on slopes, cutting a furrow and throwing up the soil to form a bank, and creation of buffer strips of perennial grasses in plantings of grain crops. Erosion of the soil is also prevented by leaving fallow land covered instead of bare. Use of these simplest and inexpensive soil and crop practices considerably reduces the erosion of the soil, and the moisture stored up in the layer occupied by the roots increases 15-20 percent.

On eroded pastures and leas which have grown up, a sequence for application of mineral fertilizers has been established which ensures creation of a favorable relationship between grasses and legumes. Experiments have confirmed that on intensely eroded soils systematic application of nitrogen fertilizers yielded an average hay harvest of 22-23 quintals over a 15-year period, as against 3-4 quintals from unfertilized soils.

We have dwelt on the simplest erosion-control measures in this detail in order to emphasize that erosion control does not always require large capital investments by any means. Every farm is able to set up a barrier against these baneful processes. An instruction containing recommendations has been prepared for them, soil-erosion maps have been compiled, a popular-science film entitled "Erosion--Scourge of the Land" has been made, and seminars, conferences and symposiums have been held for farm directors during which they examine the institute's experimental fields. But we can only be sorry that our educational activity has not been reinforced with appropriate organizational forms and frequently turns into a recitation of emotional appeals. It is the rare farm that adopts our recommendations as its weapons, but for this the appropriate units of the republic's Ministry of Agriculture is directly responsible.

We understand quite well, of course, that with soil and crop practices alone it is not possible to provide the land perfect protection against erosion, and for that reason we will have a few words about the lasting application of efforts and capital investments.

On the republic's kolkhozes and sovkhozes soil-conservation and soil-improvement projects are carried out separately from one another. Hydraulic engineering structures are built on one farm, on another slopes are terraced, on a third they plant forests, and somewhere on a fourth or fifth they carry out radical or superficial improvement of land used for raising fodder. There is nothing to be said about constructive results from this

disconnected effort. The confusion begins with the very compilation of the project assignment. Erosion-control measures are planned by Armgiprozem [Armenian Republic State Planning Institute for Land Use Measures], Armgiprovodkhoz [Armenian Republic State Institute for the Planning of Water-Management and Reclamation Construction] and Armlesproyekt [(?) Armenian Republic Institute of Forest Planning]. Although ultimately they will cover the same areas, the plans are compiled separately, without the necessary interlinkage.

Projects and funds to carry out erosion-control projects also go to a great number of organizations--Goskomsel'khoztekhnika [State Committee for Supply of Production Equipment for Agriculture], Glavarmvodstroy [(?) Main Administration for Construction of Water-Management Projects in Armenia], the State Committee for Forestry and a number of others. As a result less than half of the many millions of rubles of capital investments allocated in the seventies to carry out erosion-control measures were used. In those same years plans for construction of erosion-control and hydraulic engineering structures were carried out at a level of 69.1 percent, and 60 percent of the planned forest belts to protect fields were created. Moreover, the quality of the projects leaves something to be desired.

The present general chart of erosion-control measures should in our view be accompanied by a schedule showing the order in which the projects would be carried out from year to year. This is why we feel that we need a single source from which assignments would be issued for project planning and a single general contractor for project planning. Nor does the republic have specialized organizations performing the entire range of operations involved in combating soil erosion. Recommendations have repeatedly been made for creation of zonal trusts or organizations which would operate as general contractors, but so far no practical steps at all have been taken in this direction.

From time to time there are articles in the press which pose the question in sharp terms about the need to manufacture machines and implements for work on steep slopes, machines for mountain farming. But they do not exist. Over the last 20 years the scientific-production association Armsel'khozmekhanizatsiya, in accordance with the agrotechnical requirements of soil scientists, has designed a number of pieces of machinery for operation under mountain conditions. State tests have been passed successfully by more than some 10 machines, but they have not been put into the form of experimental prototypes, since there is no enterprise that would undertake their series production.

Who should assume the duties of manufacturing new machines and implements for mountain farming? The Ministry of Agriculture? It has no plants. Goskomsel'khoztekhnika? It is mainly engaged in trade and is concerned with current repairs. The Ministry of Tractor and Agricultural Machinebuilding? It cannot fool with such a "trifle." There is in our view one way out: to create in the mountain republics enterprises specializing in the manufacture of small-size agricultural equipment.

Erosion.... It shows its nature, if we can put it that way, in an overall pattern--through the washing away of the soil, the loss of fertility, reduced yields, silting of rivers and irrigation systems, the washing out of roads and many other ways. Efforts also have to be interrelated in opposing its adverse effect and in restoring the fertility which the land has lost.
[588-7045]

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CSO: 1840

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UPGRADING THE PROCESSING OF COARSE FEED

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 63-69

[Article by V. S. Krasnov, corresponding member of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin; Ye. I. Reznik and I. I. Meylakhs, candidates of engineering sciences; and V. I. Tuchin, All-Union Scientific Research Institute of Rural Electrification--VIESKh, submitted 9 Mar 80]

[Text] Coarse fodder is the chief source of nutrients for cattle: all types of hay, straw, chaff and other straw-like waste from field-crop cultivation. The main goal of increasing the use of feed rich in cellulose is to save grain feed, so that the outlay thereof would be reduced to one-half per kilogram weight gain, as compared to traditional feed. This means, that the outlay of grain feed should not exceed 1-1.5 kg/kg weight gain in fattening cattle, and 0.2 kg/liter milk when used as feed for cows with mean annual milk yield of 3000-3500 liters.

About 200 million tons of straw are processed annually, while 120 million tons are used as feed, the loss constituting 20-30%. In order to increase the use of straw, modern methods of processing it include production thereof in dry or wet ground form as a mandatory element in different types of bulk feed mixtures, complete dietary pellets or granules. In chopped form, straw is better mixed with other elements of the diet and is entirely consumed by animals. However, large-volume straw processing is being held up by the low productivity of grinding machines and high cost thereof: a ton of such straw costs 2-15 rubles. There is drastic reduction of productivity, 4-10-fold increase in energy consumption and an increase in cost of grinding when processing coarse feed with high moisture content.

This report deals with the study and development of means of upgrading the technological process of grinding straw on the basis of refinement and increase in efficiency of existing machines, with development of new methods for qualitative evaluation of the grinding process, which would permit the design of new models with high technical and economic indicators, on the basis of zootechnical requirements.

The zootechnical specifications (for feed shops at farms) for grinders and crushers include the following: the straw should be ground into particles 20-50 mm in size with at least 90% stalk splitting; regulation of degree of grinding as related to change in feed moisture content from 20 to 60%; growth of productivity to 2-5 tons/h; reduction of energy consumption of the process to 6-4 kW·h/ton and of metal content of the machines; exclusion of manual labor; increase in reliability of grinding devices.

The existing types of such equipment refer to a large group of crushers and grinders differing in design and system of organizing the work process. This requires analysis of their grinding apparatus and classification on the basis of design and technological features. Hammer crushers are the most widely used. They consist of a housing with loading conveyer or hopper, hammer drum [barrel] with hammers suspended on hinges, a screen [sieve], deck and operating device (Table 1).

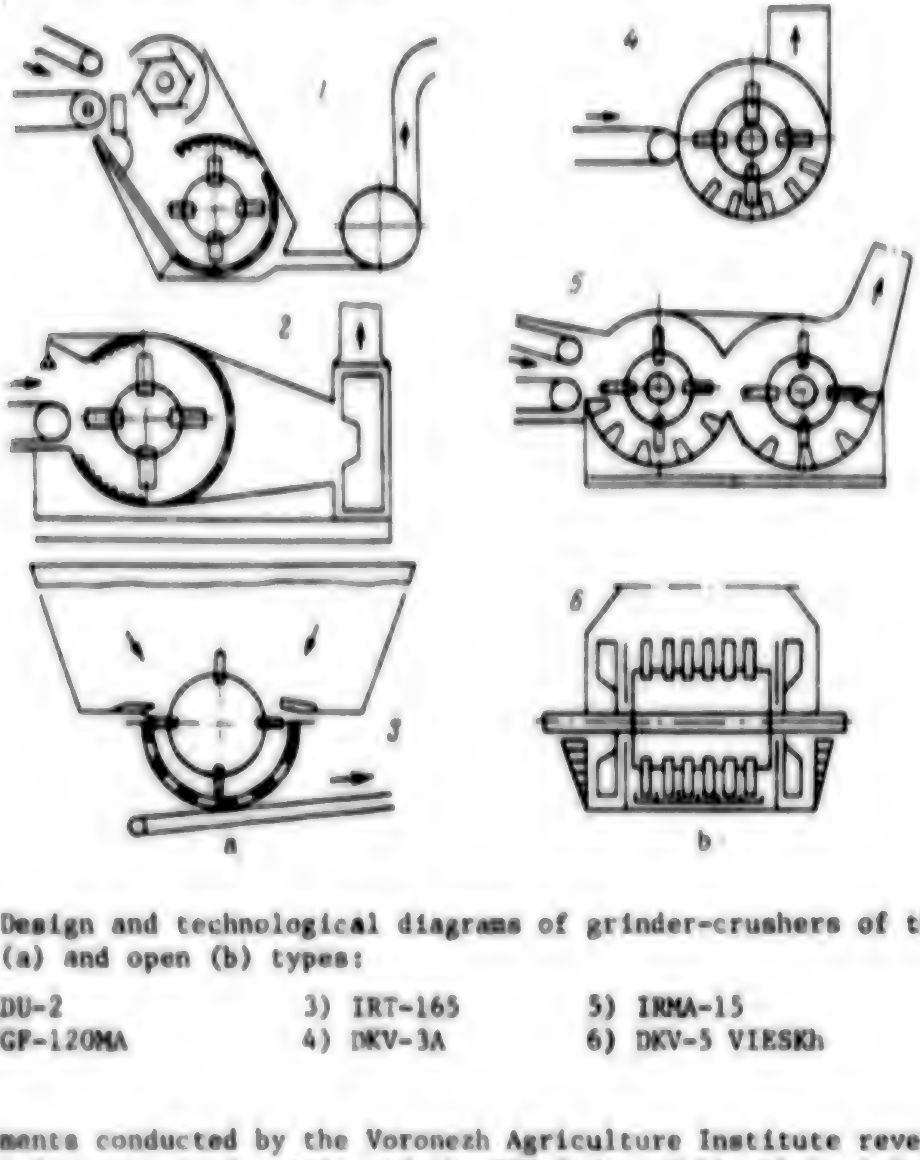
A distinction should be made between crushers of the closed or open type [4], depending on how the process is set up in the working chamber; models of the former type (KDU-2, FGF-120MA and IRT-165) are illustrated in the Figure (a). In these crushers, the screen and decks surround the drum, and the straw entering the crushing chamber makes numerous circular movements, settling in the chamber in the form of a loose layer. Here, the material is ground as a result of the numerous impacts of the hammers and crushed as they travel over the moving layer. Circulation of the material in the chamber is the typical feature of crushers of the closed type. Dragging stalks with increased moisture over the surface of the screen stops it up, and this is the main flaw of this type of grinder.

There is a specific rate of impact, at which ultimate tensile stress occurs, for each level of moisture content in the straw. According to the data of T. Abilzhanov (Kazakh Scientific Research Institute of MESKh [mechanization and electrification of agriculture]), with 10-20% moisture content, ultimate tensile stress appears at speeds of 45-57 m/s, with 20-30% moisture this happens at 64 m/s, and in the case of 30-40% moisture it is over 70 m/s.

The universal KDU-2 0 crusher has two successive stages, grinding with knives and a hammer rotor with a screen. Dry straw is processed into meal, while the screen gets clogged if the feed is moist. FGF-120MA and IRT-165 grinders grind the straw in combination with the screen. Their productivity diminishes by 4-10 times when processing moist straw, energy consumption increases to 100 kW·h/ton, and screens with a mesh 20 and 50 mm in diameter get clogged.

Thus, there are substantial flaws in grinders equipped with screens: high energy consumption reaching 22-100 kW·h/ton, low reliability, decline of productivity from 6.6 to 0.63 ton/h (see Table 1) when moisture content increases from 10 to 28%. For this reason, the straw must be constantly

dried to a nominal moisture content of 10-15% when using such equipment, and it is necessary to re-equip (experiment of the Voronezh Agricultural Institute) or regulate the grinders.



Design and technological diagrams of grinder-crushers of the closed (a) and open (b) types:

1) KDU-2	3) IRT-165	5) IRMA-15
2) PGP-120MA	4) DKV-3A	6) DKV-5 VIESKh

Experiments conducted by the Voronezh Agriculture Institute revealed that one can increase productivity of the KDU-2 (see Table 1) by 1.5-2 times by removing the return connecting pipe with snail-case housing, and plug the opening with a disk 200 mm in diameter, so that air would enter the crusher chamber only from the zone of the crusher [3]. A screen is installed with 20-30-mm mesh. A finger-action beater, 285 mm in diameter, is installed in the place of the cutting drum, and the 38-gear sprocket of the conveyer drive is replaced with a 22-gear one; an emptying neck [throat] 0.5-0.7 m in diameter is installed instead of the lock gate. However this updating is warranted only for grinding straw with 10-25% moisture, and it does not solve the problem of airborne delivery of the product from the processing point to the place where it is collected and batched.

Table 1. Technical specifications of grinder-crushers

Parameter	KDU-2	PGF-120MA	IRT-165	IGK-30B	DKV-3A	DKV-5VIESKh	IRMA-15
	closed type			open type			
Output (tons/h)	0.83 — 1.00	1.46 — 2.5	0.63 — 6.6	0.8 — 1.0	1.4 — 1.8	2.05 — 4.96	2.5 — 6.7
Power (kW)	30	81.5	165	30	30	40	55
Drum diameter (mm)	390	585	535	1000	400	600	630
Drum width (mm)	390	870	1 020	27	575	642	800
Rotation (rev/min)	2730	1810	2 100	980	2500	1460 — 2500	1300 — 1900
Periph. speed (m/s)	71.5	55.4	58	51	40.5	52 — 89	42 — 60
Number of hammers	80	120	40	100	81	88	135
Weight of grinder (tons)	1050	1830	4 186	1370	910	1880	1335
Dimensions: (mm) length	2195	4630	11 550	3325	2600	3800	4600
width	1690	1435	3 025	2095	1310	1780	1480
height	2975	1480	3 630	3500	3000	3620	1600
Fan: diameter (mm)	475	—	—	—	—	600	—
width (mm)	60	—	—	—	—	60	—
number of blades	6	—	—	—	—	6	—

Small-mesh screens (16-50 mm) are replaced with 75 or 100 mm screens in the PGF-120MA and IRT-165 grinders, depending on the size, firmness and increase in moisture of straw. In addition, there are provisions for regulating the drive and loading in the hopper-type IRT-165 grinder-crusher. The hopper is so loaded that the contents do not fall overboard; if it is thrown upward, this is indicative of a small load. The frequency of rotation of the hopper [bin] is altered by a flow regulator. If the rotor is overloaded, the hopper is stopped or put in reverse, and then the drum hammers additionally grind the mass without additional loading. Thus, there is elimination of overloading of the IRT-165 crusher-grinder [2].

The intensity of feeding straw on the hammer drum is regulated not only by revolutions of the hopper, but arrangement of feeding blades and gears of the ledger blade rack [cutter] of the IRT-165. Placement of rack blades in top position lowers productivity and in bottom position, raises it.

The principle involved in grinding straw in the IGK-30B open type unit (breaking, tearing, grinding) is based on the use of brittleness of dry stalks. It yields a good quality of ground dry stalks that are split lengthwise. When there is high moisture content in the straw and it is no longer brittle, minimally susceptible to tearing and grinding, there is difficulty in operating the IGK-30B grinder: the stalks stick to the pins and slow down the rotor. In addition, this grinder does not solve the problem of air-borne delivery of the end product from the processing place to the place where it is accumulated and batched in the feed shop.

In grinders of the open type, straw is processed in a direct-flow cycle: it is

fed from the conveyer between the hammer rotor, which turns in the grinding chamber, and "protivoshtifty" [ledger pins?] of the deck (which cover 90-150° of the chamber circumference); it is then ground, split and, without surrounding the circumference as it moves, passes through the guide throat and is ejected into the air line [pneumatic conveyer?]. In secti n (b) of the figure, numbers 4, 5 and 6 illustrate grinders of the open type, DKV-3A, IRMA-15 and DKV-5 VIESKh, and their specifications are listed in Table 1.

The hammer-equipped DKV-3A grinder has one grinding step: hammer rotor and a deck executed in the form of stationary "ledger pins." Grinder IRMA-15, which was designed by the VNIPTIMESKh [All-Union Scientific Research, Planning and Technological Institute of Mechanization and Electrification of Agriculture?] [2] has two successive grinding steps, and quality of grinding can be regulated: two hammer drums and screenless decks, on which the "ledger pins" are installed. In order to obtain the required quality of feed processing and uniform loading of both drums, there is closer spacing of ledger blades on the rear deck than the front one. Grinding is regulated by means of installing the required number of ledger blade pins, as well as changing the rate of rotation of hammer drums by means of regulators (in the range of 1300-1800 r/min).

All of the above hammer-equipped grinders, as well as the pin-equipped IGK-30B, deliver ground straw over a distance of about 3-5 m, which is not adequate for the conditions in feed-processing shops to deliver feed into batchers, and they require installation of additional transportation devices. This lowers the reliability of the entire line and increases its metal content.

The idea of VIESKh to develop a functional unit in a hammer-equipped grinder that would serve two purposes, to grind coarse straw with ordinary and high moisture and to form a high-power flow of air to eject the ready product over a distance of up to 20-30 m, is a more rational solution.

The stationary variant of the grinder, DKV-5 VIESKh, manufactured for this purpose has a grinding chamber 700 mm in diameter, equipped with "ledger pins," beaters and removable screen, hammer rotor with two coaxially placed blowers, band conveyer, compressed-air line and electric drive (see Figure (b)--6). Its output when processing dry straw (using the screen) constitutes 0.84-2.05 ton/h, and for straw with high moisture content (removing the screen) it is 2.05-4.96 tons/h. The quality of grinding dry straw is regulated by using screens with different mesh size, and that of grinding moist straw is adjusted by placing a certain number of ledger blade pins on the deck and alter ng the angular velocity of the hammers.

A study of the aerodynamic parameters of the technological process of grinding straw revealed [4] that, while series-produced hammer crushers of the closed type generate a flow of only 5-9 m/s in the ejecting duct, the

hammer-equipped drum with blowers in the open type grinder, type DKV-5 VIESKh, develops a speed of 38-51.4 m/s, which is sufficient to transport the ground feed over a distance of up to 20-30 m. The rotor blowers have maximum efficiency when the curved blades are tilted forward.

A comparative evaluation of quality of performance of grinders of the closed and open types (Table 2) shows that those equipped with screens consume more energy that the open type, they are less reliable and productive. In spite of these flaws, there will still be series production of the closed type of grinders, as before, under the next two five-year plans. This is attributable to the fact that the quality of design of the grinding equipment of the grinder, degree of grinding and quality of the end product are evaluated on the basis of obsolete OST's [All-Union standards] (on the basis of the weighted mean size of ground particles). When one uses an obsolete method to assess the quality of operation of the machines we are discussing, one finds that the closed type of grinders (Table 3) are even more promising.

One of the means of improving the technological process of grinding straw is to develop new methods of evaluating the quality of design of the working part of the grinders and crushers, which would make it possible to establish the main criteria for optimization thereof and derive an objective conclusion as to the prospects of a given grinder. For this reason, as shown by practice, the previously determined weighted mean [wt.m.] of the end product cannot be a criterion for optimizing the machines.

A scrutiny of published works dealing w th the study of the process of grinding coarse feed for feed plants shows that there are even greater contradictions in setting the range of requirements as to the particle size of ground coarse feed. This is one of the causes hindering development of a new method. For example, according to the zootechnical specifications for the hopper-equipped IRT-165 grinders, the following groups of fractions are recommended: particles up to 20 mm in length should constitute at least 80% of the total, those up to 50 mm in length should constitute at least 85% and up to 75 mm, at least 90%. But this range of specifications as to size (75 mm) of mass that is not ground finely enough is inadequate, since it does not conform with the range of particle lengths that is required for trouble-free operation of mixing and steaming units (S-12, S-7 and others), mixer-distributors (RSP-10 and ARS-10), screw [worm] mixers and other types of mixers used with the above machines in the assembly lines of feed-processing shops at farms.

For the KDU-2 and FGF-120MA grinders, there is too wide a range of specifications for the size of ground particles reduced to powder, which is in contradiction with the physiologically necessary particle length (20-50 mm), used to produce complete-diet feed mixtures, and which was approved in the zootechnical specifications for feed processing shop equipment. Let us assume that the particle size for coarse feed should be 20-50 mm according to physiological requirements. With such formulation of the problem,

information about the quality of grinding coarse feed by any machine can be relayed by three figures: the one set by the range of 20-30 mm, the one resulting from excessively fine grinding and the one resulting from insufficient grinding. Evaluation of the quality of processing coarse feed is based on measurement of individual particles, distribution thereof in different fractions and weighing each fraction (0-10 mm; 10, 1-20; 20, 1-30; 30, 1-40; etc.).

Let us use several parameters to evaluate the grinding quality. Fineness of grinding λ serves to measure the degree to which straw is ground, as determined by the ratio of weighted mean lengths of particles of the initial material and end product of grinding, with the formula:

$$\lambda = l_{wt.m.i.}/l_{wt.m.e.}$$

where $l_{wt.m.i.}$ and $l_{wt.m.e.}$ refer to the weighted mean size of the initial and end product of grinding, respectively (in mm);

$$l_{wt.m.e.} = \frac{\frac{l_1}{2} G_1 + \frac{l_1 + l_2}{2} G_2 + \ldots + \frac{l_{n-1} + l_n}{2} G_n}{G},$$

here, $l_1, \ldots, l_n$ refer to particle length according to fractions (mm); $G_1, \ldots, G_n$ refer to weight of fractions (g) and G is the weight of the sample (g).

The previously used method of evaluating quality of grinding according to the weighted mean maximum linear size of the particles has a substantial flaw: It does not take into consideration the scatter of the feed in the above-mentioned groups of fractions. For this reason, to evaluate ground feed according to homogeneity of composition, calculation is made of standard deviation S_0 and coefficient of variation v from the mean particle size l_0, which is physiologically substantiated for cattle in the following formulas:

$$S_0 = \sqrt{\frac{\Sigma (l_i - l_0)^2 G_i}{\Sigma G_i}},$$

where l_i is the mean size of particles referable to a fraction (mm), G_i is the weight of the fraction (g); with $S_0 = 0$, all of the particles in the sample are of the average specified size, and the quality of grinding coarse feed is ideal, whereas in the case where S_0 does not exceed half the field of the specified size, the quality of grinding is good [5];

$$v = (S_0/l_0) \cdot 100,$$

where v is the coefficient of variation of weight characterizing the quality of design of the grinding device and percentage of concentration of particles within the specified range of sizes.

Table 2. Indicators of quality of operation of crusher-grinders for coarse feed

Brand	Clear opening coefficient of screen	Straw moisture (%)	% ground particles of following lengths (mm)					Split (%)	Specific energy consump. (kW·h/ton)
			to 10	10.1–30	30.1–50	50.1–100	>100		
1 KDU-2	0.4	13.0	92.6	2.3	0.1	—	—	99.0	21.0
2 FGF-120MA	0.37	22.8	64.0	35.6	0.26	0.14	—	99.2	20.1
(Bulgaria)	0.35	[illegible].8	70.0	26.4	3.58	0.06	—	96.4	17.3
3 IRT-165	0.31	22.8	64.6	30.3	4.33	0.71	—	93.1	13.6
	0.32	20.5	75.5	21.1	2.4	—	—	97.5	100.5
	0.31	20.5	52.8	30.6	10.2	6.4	—	93.6	14.6
4 IGK-30B	0.30	20.5	32.0	38.5	14.5	15.0	—	93.1	9.9
	1.0	13.1	18.7	44.7	23.4	8.4	4.8	86.6	8.0
	1.0	27.6	17.4	38.3	24.7	12.0	7.6	82.4	11.2
5 DKV-5 VIESKh	1.0	20.8	20.1	45.2	23.2	7.3	3.7	82.2	14.0
	0.4	20.5	52.15	32.51	10.61	3.53	1.1	90.5	14.7
6 DKV-3A	1.0	37.5	26.03	37.93	21.52	10.12	4.4	81.6	6.7
	1.0	45.4	48.3	40.5	7.4	2.3	1.5	93.0	5.4
7 IRMA-15	1.0	47.3	38.9	41.7	10.2	7.0	2.2	95.7	5.9
	1.0	35.5	31.0	46.0	16.7	6.3	0.0	82.0	6.8
	1.0	51.2	37.6	45.8	8.9	9.7	1.0	90.6	4.4

Table 3. Comparative features of methods of evaluating quality of grinding straw

Grinder	Screen mesh diameter (mm)	OST 70.19.2-74 $l_{wt.m}$ (mm)	By new method				
			λ	S_0 (mm)	ν (%)	K	n
KDU-2	10	5.4	45.30	29.74	81.9	0.00554	3971
PGF-120MA (Bulgaria)	10 16 25	9.6 9.9 10.9	5.50 5.36 4.86	26.00 26.70 26.5	76.1 74.5 75.7	0.02960 0.05570 0.06080	1364 314 190
IRT-165	20 50 75	8.6 16.8 25.6	7.65 3.91 2.57	27.2 26.5 24.2	77.8 71.7 69.2	0.05230 0.11930 0.13210	1898 123 63
IGK-30B	—	18.6–25.3	2.09–2.73	22.3	63.6	0.20800	45
DKV-3A	—	16.0–20.6	4.81–7.31	28.8	82.3	0.10150	55
IRMA-15	—	20.4–25.6	1.77–2.56	21.4	61.0	0.23440	34
DKV-5 VIESKh	530×110 —	16.6 29.5	6.03 3.38	26.0 28.8	74.28 82.70	0.14800 0.20800	99.3 29.9

After multiplying the ratio of permissible deviation of mean set particle size to its standard deviation S_0 by the ratio of weight of fractions of particles of a specified size to the weight of the sample, we obtain a dimensionless coefficient K, which we call the indicator of quality of grinding coarse feed:

$$K = \frac{S_{\Pi} \sum_{l_1}^{l_2} Q_l}{S_0 \cdot \sum_{0}^{l} Q},$$

where S_{Π} = 15 mm, is the permissible deviation of specified length of particle for large cattle; $\sum_{l_1}^{l_2} Q_l$ is the weight of the fractions of the required size (g) and ΣQ is the total weight of the sample (g).

To optimize the parameters studied and operating modes of grinders-crushers of coarse feed, we add parameter η, which is obtained as the ratio of specific expenditure of energy (q, kW·h/ton) in the process to the indicator K of grinding quality:

$$\eta = q/k$$

The distinction of η is that it characterizes the specific energy consumed to produce the part of coarse feed that is certified [quality standardized]. A minimal value of this parameter, which combines evaluation of energy consumption and quality of grinding, optimizes the parameter under study or operating mode of the grinder.

We used the proposed parameters for evaluation of quality of grinding coarse fodder in a comparative evaluation of different machines that were being tested (see Table 3).

For straw ground by machines of the selected series, the values of λ range from 45 to 2. The coefficient of variation ranges from 82 to 61%, while the standard deviation drops from 28 to 21 mm. Quality index K is 5-10 times lower for screen-equipped grinders processing straw differing in moisture content than for those without screens. At the same time, optimization indicator η is 30-50 times higher in the former grinders, when the screen mesh is reduced in size. This is indicative of a significant inconsistency in quality of coarse feed processed by these machines with the zootechnical specifications for feed-processing shops.

As can be seen in Table 3, the lowest index of optimization for screen-equipped grinders was obtained for the IRT-165 with screen mesh 75 mm in size. The one- and two-rotor screenless grinders are more promising; in them quality index K reaches 0.23, while optimization index η drops to 34-30. These parameters should be taken as the basis in designing new and efficient grinder-crushers for coarse feed.

Conclusions

The new method for assessing the quality of ground coarse feed shows the direction to follow in upgrading series produced grinding machines.

Hammer drum grinders require radical updating in order to grind coarse feed, by means of obtaining the following parameters: specific energy consumption of the process of grinding straw with ordinary and high moisture content in the range of 6-4 kW·h/ton; peripheral velocity of rotor hammers (for straw with high moisture content) in the range of 70-75 m/s; velocity of air traveling through bleeding duct at least 38-51 m/s; exclusion of screens; installation of special adjustable decks and pneumatic feed, as well as execution of grinder design that combines operations of mechanized loading, grinding and delivery of the ready product over a distance of up to 20-30 m.

BIBLIOGRAPHY

1. Bespamyatnov, A. D., et al. KUKURUZA [Corn], No 11, 1979.

2. Dorzhiyev, A. B., et al. TEKHNIKA V SEL. KHOZ-VE [Technology in Agriculture], No 2, 1979.

3. Kukta, G. M. "Technological Processing and Preparation of Feed," Moscow, 1978.

4. Mel'nikov, S. V. "Mechanization and Automation of Livestock Farms," Moscow, 1978.

5. Meylekhs, I. I. MEKHANIZATSIYA I ELEKTRIFIKATSIYA SOTS. SEL. KHOZ-VA [Mechanization and Electrification of Socialist Agriculture], No 1, 1975.

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ACADEMY OF AGRICULTURAL SCIENCES DISCUSSES ORGANIZATIONAL FORMS OF INTERFARM COOPERATION AND AGROINDUSTRIAL INTEGRATION

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 132-134

[Article]

[Text] The presidium of VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] discussed the matter of organizational forms of interfarm cooperation and agroindustrial integration. At its meeting, a report was delivered by Prof M. M. MAKEYENKO, deputy director of the All-Union Scientific Research Institute of Agricultural Economics. The following participated in a discussion of this matter: A.A. NIKONOV, academician secretary of the Department of Economics and Organization of Agricultural Production of VASKhNIL; V. S. PROSIN, head of the main administration for interfarm cooperation and agroindustrial integration of sovkhoz and kolkhoz production of the USSR Ministry of Agriculture, and others.

The presidium of VASKhNIL observed that, to implement the decisions of the July (1978) plenum of the CC CPSU, the All-Union Scientific Research Institute of Economics of Agriculture, together with co-executors, has performed work on scientific generalization and economic classification of organizational forms of interfarm and agroindustrial formations as applied to different sectors and directions of agriculture. This made it possible to approve, on an interagency basis, a classification of the main organizational forms of interfarm cooperation and agroindustrial integration, and to elaborate recommendations.

A study of the various existing organizational industrial structures of integrated formations revealed that the share of interfarm enterprises for agricultural production is still low; there is prevalence of enterprises related to production equipment servicing and nonproduction work. Of the organizational forms of interfarm cooperation in agricultural production, those meriting attention first of all are the ones dealing with the most complex and responsible stages of the production process (seed growing, production of sowing material and seedlings, feed, livestock reproduction, etc.).

The presidium of VASKhNIL resolved to approve of the work done by VNIESKh [All-Union Scientific Research Institute of Economics of Agriculture] on determination, generalization and economic classification of organizational forms of interfarm cooperation and agroindustrial integration. In view of the diversity of these organizational forms, the presidium recommended that the Department of Economics and Organization of Agricultural Production of VASKhNIL, the VNIESKh and co-executor institutes continue and expand studies to find the most effective organizational forms of specialization and concentration on the basis of interfarm cooperation and agroindustrial integration. It was recommended that special attention be given to elaboration of specific organizational production structures of various interfarm and agroindustrial formations, that would be instrumental in continued growth of socialization, increase in quantity and reduction in cost of production, with concurrent growth in labor productivity.

The administration of VNIIESKh (G. A. Dolgoshey) was instructed to render extensive scientific methodological assistance, in the course of elaborating sectorial and regional recommendations on development of interfarm cooperation and agroindustrial integration, to scientific research institutes of agricultural economics in different republics and zones, and to All-Union sectorial institutes in the area of research to substantiate the most effective organizational forms of interfarm and agroindustrial formations under the different, specific zonal conditions of agriculture.

* * *

The following individuals discussed the problem of development of scientific research to increase sunflower production in our country: Academician P. P. VAVILOV, president of VASKhNIL; L. P. KARMANOVSKIY, candidate of engineering sciences (agricultural department of the CC CPSU); D. S. VASIL'YEV, deputy director of the All-Union Scientific Research Institute of Oleaginous Crops; A. V. PUKHAL'SKIY, L. K. ERNST, N. I. VOLODARSKIY and A. A. NIKONOV, academicians of VASKhNIL; as well as representatives of the USSR High-Grade Seed Industry ["sortsemprom"] (A. T. Slyusarev), Ukrainian Scientific Research Institute of Plant Growing, Breeding and Genetics imeni V. Ya. Yur'yev (A. D. Gumenyuk) and others.

The sunflower is the main oil-bearing crop, the share of which in overall vegetable oil production constitutes over 65% in the USSR. The area occupied by it constitutes more than 4.5 million hectares. The intermediate products of processing sunflowers (grist, oil cakes) contain 600,000-700,000 tons of protein.

At the leading farms of North Caucasus, the Ukraine and Moldavia, up to 25-30 q/ha [quintals/hectare] or more of this crop are harvested. Taking up 7-8% of the tilled land at the farms, it yields up to 25-30% profit in the field-crop sector. At the same time, there has been deterioration of status of production and quality of sunflower seeds in the last few years.

This situation can be interpreted as the consequence of waning attention to this crop on the part of local agricultural bodies, farm managers, gross infractions of farming technology, serious oversights in seed growing, inadequate material and technical provisions for this sector, as well as insufficiently active work of scientific institutions and, first of all, the Scientific Research Institute of Oleaginous Plants (N. I. Dvoryadkin, director) in the area of publicizing and introducing new cultivars and progressive technology into agricultural production.

The advances in sunflower breeeding made in our country are well known. As a result of the work done by Academician V. S. Pustovoyt, oil content of this crop was raised in our country from 32-36 to 50-54%. At the same time, there was a reduction in seed hull, which made the sunflower more demanding with regard to environmental factors at the first stage of its development. The populations of cultivars developed by V. S. Pustovoyt and his disciples presently cover about 95% of farmed areas in our country. The problem of resistance of this crop to broom rape and several other diseases has been solved.

In the last decade, G. V. Pustovoyt, who was the first to use remote hybridization in breeding sunflowers, developed cultivars (interspecies hybrids) that are resistant to 4-6 pathogens, including false mildew, rust, verticillium wilt, gray [ash] rot, new strains of broom rape and others.

Cultivars notable for group immunity (Progress, Yubileynyy 60, Oktyabr') are undergoing state testing. Yubileynyy 60, a cultivar that is resistant to false mildew, verticillium wilt, sunflower moth and new strains of broom rape, as well as 60-70% resistant to rust and gray rot has been scheduled to be zoned in Krasnodarskiy Kray in 1981.

K. I. Soldatov developed a sunflower strain, Pervenets, by means of chemical mutagenesis, which contains up to 75% oleic acid, versus 30-36% in the ordinary cultivars. In 1979, it was raised over an area of about 10,000 ha. A new type of comestible oil, Kubanskoye Salatnoye [salad oil] is being produced from the seeds of that cultivar.

However, there is some lag in the area of breeding hybrid sunflowers. Work to develop hybrids began with a significant delay in our country. To date, we know of only one zoned hybrid, Rassvet, which was developed by the All-Union Breeding and Genetic Institute (V. V. Burlov). Three sunflower hybrids of the All-Union Scientific Research Institute of Oleaginous Plants (breeders: L. K. Voskoboynik and N. I. Bochkarev), Prizyv, Pochin and Uspekh, are undergoing state strain testing. The hybrids named Odesskiy 91 (All-Union Institute of Selection [Breeding] and Genetics), Druzhba (All-Union Scientific Research Institute of Plant Growing) and Soyuz (Selektsiya Scientific Production Association, All-Union Scientific Research Institute of Plant Growing) are also undergoing state testing.

The breeders at the All-Union Scientific Research Institute of Oleaginous Plants have developed methods for obtaining sterile analogues and strains that restore fertility, procedures for raising hybrid seeds on the basis of cytoplasmic and chemically induced male sterility. The change to use of hybrid seeds to raise sunflowers will increase the yield of this crop by at least 10%.

Most of the sunflower cultivars presently produced on a broad scale are referable to the group that matures at an average or late time. Harvesting thereof is usually stretched out in time, which lowers the quality of seeds, causes them to spoil and worsens the quality of the oil. The situation is drastically aggravated in years with a high level of precipitations and low temperatures in the fall (1976, 1977, 1978). Under such conditions, when the plants are stricken with sclerotiniosis and gray rot, it results in drastic deterioration of seed quality. The serious flaws in locating cultivars in different zones of the country and low share of cultivars that mature in the spring create serious difficulties in raising this crop.

In the last few years, the All-Union Scientific Research Institute of Oleaginous Plants and other scientific institutions have intensified significantly work on development of earlier ripening cultivars and hybrids. At the present time, a group of early ripening cultivars is undergoing state strain testing: Trudovik, Armavirskiy 50, Skorospelyy, Yugo-Vostochnyy 2 and Vostok. In 1980, Nadezhnyy (All-Union Scientific Research Institute of Oleaginous Plants), an ultra-early ripening cultivar characterized by a vegetation period of 80-85 days and mean yield of 28.4 q/ha, was transmitted for testing.

Breeding work is continuing to improve the quality of oil. Studies have been completed on development, by means of selection among cultivar populations of families of sunflowers with different proportions of fatty acids in the oil. In vivo analysis of the achene followed by self- and group-pollination resulted in isolation of specimens of Peredovik and VNIIMK 8931 containing up to 86% oleic acid, 70% linoleic and 11% palmitic acid, 44% each of oleic and linoleic acids, which opens up vast possibilities of developing cultivars with the required quality of oil for different needs.

In view of the difficulties that arise in breeding sunflowers for resistance to sclerotiniosis and gray rot, along with a search for resistance genes, the All-Union Scientific Research Institute of Oleaginous Plants is developing a set of agrotechnical and chemical measures to protect sunflowers against these diseases. In 1979, there was confirmation of data obtained in prior years concerning the high effectiveness of desiccation (magnesium chlorate, reglon and mixtures th[illegible] in lowering the deleteriousness of sclerotiniosis and gray rot. In [illegible] plots, 21% of the anthodia were stricken by these diseases, versus o[illegible] 2% in desiccant-treated plots.

The All-Union Scientific Research Institute of Oleaginous Plants and other institutions have developed the industrial technology for raising sunflowers.

Since 1979, it was included in the state plan for introduction of scientific achievements and progressive knowhow. The new technology has undergone extensive production testing in several regions of our country. The yield from sunflower crops raised by the new technology constituted about 30 q/ha in farms of Krasnodarskiy Kray, or 3.3 q/ha more than from fields using standard technology; at the Sovetskaya Rossiya kolkhoz in Pavlovskiy Rayon and Krasnaya Zvezda kolkhoz in Dinskiy Rayon, the yield was 32 q/ha, which is 3.6 q/ha more than the harvest obtained using the ordinary technology. In 1979, 27.5 q seeds were produced from every 2500 ha land in the farms of Chadyr-Lungskiy Rayon in Moldavian SSR, while at the Avrora kolkhoz in Nikolayevskiy Rayon, Dnepropetrovskaya Oblast, 37 q/ha was harvested over an irrigated area of 58 ha. This is 7-15 q/ha more than the actual harvest of sunflowers in surrounding farms.

At the same time, the status and level of scientific research pertaining to sunflower cultivation do not meet the demands of agricultural production. Breeding hybrid sunflowers is proceeding at a slow pace. The hybrids of the All-Union Scientific Research Institute of Oleaginous Plants submitted to state testing do not have appreciable advantages over cultivar populations. There are still too few early ripening cultivars in production. Many of the varieties that are raised extensively are quite susceptible to diseases. The problem of protecting sunflowers against sclerotiniosis and gray rot has not been solved; sources of immunity to these pathogens have not been found; there is slow development of chemical methods of controlling them. Sunflower breeding for heterosis is not being pursued on a sufficient scale. There is slow development of breeding work to create highly productive cultivars for northern and eastern regions where this crop is raised. There are too few studies of varietal agrotechnology for sunflowers. No system has been developed for growing hybrid sunflower seeds. The ways and means of introducing scientific achievements into production require further improvement.

The following are the first and foremost of the unsolved problems:

rapid development of interstrain hybrids on the basis of cytoplasmic male sterility with potential productivity of up to 40 q/ha, shorter vegetation period and resistance to the main pathogens;

development of an effective system of hybrid sunflower seed growing, varietal agrotechnology, refinement of the system of machines for industrial technology of farming, as well as systems of measures to control sclerotiniosis and gray rot;

development of highly productive (20-25 q/ha), early ripening and ultra-early ripening (80-85 days) strains with combined resistance to diseases and pests referable to cultivars for regions of the Central Chernozem Belt, Povolzh'ye, the Urals and Siberia;

development of cultivars and hybrids maturing at an average time (110-115 days) with high productivity (35-38 q/ha) and high seed oil content (54-55%), with immunity and tolerance to the most widespread pathogens (new strains of broom rape, false mildew, verticilliosis, phomosis, ashy rot, rust, sunflower moth and leaf-curling aphid, sclerotiniosis and gray rot).

These and other problems are covered in drafts of programs for scientific research, and this will help increase production and improve the quality of sunflower seeds in our country.

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A large group of employees of the All-Union Scientific Research Institute of Electrification of Agriculture was awarded the Testimonial of VASKhNIL for their significant contribution to development of electrification of agricultural production and in connection with the 50th anniversary of the foundation of that institute.

* * *

The following were awarded the Testimonial of the presidium of VASKhNIL at the recommendation of the Board of Young Scientists at the All-Union Scientific Research Institute of Economics of Agriculture, for the best scientific papers delivered at the interinstitute conference of young scientists commemorating the 110th anniversary of the birthday of V. I. Lenin: Ye. I. Andreyeva, V. M. Bautin, N. I. Vasil'yeva and N. V. Cherednik.

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One of the oldest scientific publications of VASKhNIL, the theoretical and scientific methodological journal MEKHANIZATSIYA I ELEKTRIFIKATSIYA SEL'SKOGO KHOZYAYSTVA [Mechanization and Electrification of Agriculture] is now 50 years old. In these years, the editorial office and editorial board of this journal have done much work to publicize the agrarian policy of the Party and to introduce scientific and technological achievements into agricultural production. This journal regularly published the results of research conducted by Soviet scientists, which dealt with the most important problems of agricultural mechanics, theory of agricultural machines, progressive mechanized technology; it asserted the fact that our country's scientists are in the lead and aided it in educating young scientists.

In view of the many years of fruitful work of this journal, the presidium of VASKhNIL bestowed its Testimonial to its editorial office.

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PLENARY SESSION OF THE PEAT COUNCIL OF THE PRESIDIUM OF THE ALL-UNION ACADEMY OF AGRICULTURAL SCIENCES IMENI V. I. LENIN (MOSCOW, 25 FEBRUARY 1980)

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 6, 1980 pp 147-149

[Article by A. A. Ogradin]

[Text] The plenary session of the Peat Council under the presidium of VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] was attended by academicians and corresponding members of VASKhNIL, directors and scientists of planning and scientific research institutes, representatives of the USSR and RSFSR ministries of agriculture, RSFSR Ministry of the Fuel Industry, RSFSR Ministry of Geology and other organizations.

In his opening remarks, S. G. SKOROPANOV, Academician of VASKhNIL and chairman of the council, stated that the fuel and energy industry was the chief consumer of raw peat until very recently. At the present time, agriculture uses up to 80% of all peat utilized in the national economy of our country. Thus, agriculture has become the main consumer of peat production.

Under current conditions, a conservative attitude toward natural resources, rational and more economical use of peat in agriculture have become a new and important problem. The council praised Estonia, where peat is used economically, expenditures for the production and use of peat are covered by productivity of animals and yield of high-grade organic fertilizer. Unfortunately, the situation is far from being the same in many parts of our country.

The science dealing with peat is entering into a new stage of its development, which is characterized by new tasks and methods of performing them. All scientists concerned with the use of peat must apply a maximum effort in order to decisively raise the theoretical sophistication of research and, on this basis, assure substantial progress in agriculture.

In his paper, entitled "Main Directions of Scientific Research Pursued at VNIITP [All-Union Scientific Research Institute of Peat Production] on

Use of Peat and Peat Deposits in Agriculture," L. N. MALKOV, deputy director of that institute observed that wide use of peat and products obtained from processing it constitute one of the reserves for development of agriculture in our country. It is imperative to pay special attention to comprehensive studies of composition and properties of peat obtained from different sources and, particularly, the composition of organic matter and changes therein under the influence of different factors.

In the last few years, the VNIITP has elaborated a number of new technological processes, machines and equipment for manufacturing different products out of peat for use in agriculture, including the following: for drying, preparing and recovering peat; for commercial production in the field of peat fertilizer with the use of anhydrous ammonia; for the production of peat pots of substrate peat blocks and nutrient pellets of peat in cultivation of seedlings of vegetables, flowers, trees and ornamental plants; for preparation of peat substrates containing macroelements and trace elements to assure large harvests of vegetable crops, as well as soil based on highmoor peat at a low stage of decomposition; for the production of peat-sod covers for reclamation [development] and landscaping, Fialka nutrient peat soil as a consumer commodity, physiologically active substances--nitrohumin growth stimulators for use in plant growing and animal husbandry, carbohydrate and carbohydrate-protein feed on the basis of highmoor peat in a mild stage of decomposition, with the use of standardized equipment; recommendations on agrotechnology of raising perennial grasses, potatoes and other agricultural crops on improved [developed] and shallow peat bogs of the highmoor and "lowmoor" types; technological system for mining peat for agriculture on peat bogs less than 50 ha in size, with the use of appropriate equipment.

However, the technological lines, machines and equipment developed at this institute for the manufacture of new products from peat for agriculture are being produced essentially in small batches. The speaker observed that the USSR and RSFSR ministries of agriculture are not displaying proper concern about new types of peat products, and this delays further development of work in the area of utilizing peat in agriculture. One should expedite the solution to the problem of producing new technological lines, machines and equipment in order to introduce more broadly new types of peat products.

I. I. LISHTVAN, director of the Peat Institute of the Belorussian Academy of Sciences, discussed the main directions of scientific research in the area of using peat and peat deposits in Belorussian agriculture. At the present time, up to 34-35 million tons of peat are used annualy for agricultural needs. For this reason, science is confronted with the task of finding means of utilizing peat that would permit a drastic increase in effectiveness of this valuable, natural raw material, with significant reduction of volume of use.

The positive properties of peat in its natural state have a potential agronomic value, but they are not fully or completely manifested when applied to soil. The organic matter in peat should be activated as much as possible, and when applied to soil it should be balanced with the appropriate minerals of plant nutrition. Its organic substances are activated as they pass through livestock buildings, in composting with manure, preparation of peat and mineral mixtures, etc. However, the maximum and fastest result is obtained in this respect by treating peat with aqueous or anhydrous ammonia, i.e., by ammoniating it.

Studies have shown that ammoniated peat has a higher exchange base content, by an average of 15-20% in soddy podzolic sandy loam, as well as more base saturation. The process of ammoniation of peat leads to an increase in amount of labile forms of nitrogen in soil: ammonia, nitrate, readily hydrolyzable, and water-miscible substances.

The aqueous properties are quite important in soddy podzolic soil. When ammoniated peat is applied, or it is ammoniated directly in the soil, its filtration capacity and store of moisture increase by 20-25%. Ammoniation of peat has a beneficial effect on replenishing the stock of active humus of soil as a result of formation of labile humin compounds, ammonia humates, as compared to the use of aqueous or anhydrous ammonia in pure form.

Peat-humin fertilizers can be produced by means of ammoniation of peat, both beforehand and at the time of application of the initial elements, peat and ammonia, to soil. The technology for preparing fertilizers for tilled land and cultivation includes the following operations: spreading peat powder over the plot to be fertilized, spreading mineral (phosphorus and potassium) fertilizers, plowing or cultivation, with concurrent ammoniation of peat at the time the fertilizers are worked into the soil.

The many years of use of peat-humin fertilizers in Belorussia are indicative of their high efficacy, particularly when used on soil where potatoes are raised and, in addition, along with high efficacy of action and aftereffect, they aid in reducing the outlay of peat in agriculture by 20-25%.

The Peat Institute has developed the technology for producing complex mineral-humin fertilizers in granulated form on the basis of peat and sapropel [organic mud], which contain 21-26 to 36-40% active substance of nitrogen, phosphorus and potassium, depending on the composition and proportion of mineral elements. By order of the agricultural service, trace elements can be added to them. These fertilizers are a potential means of reducing drastically the outlay of peat. Studies have shown that 1 ton of such fertilizers on cultivated soddy podzolic soil replaces 10-15 tons of peat with an equivalent amount of mineral fertilizers, and they provide for the same yield from agricultural crops.

The fertility of light soil is improved by the addition of peat. After application of 200-400 tons peat per hectare, there is a drastic change in

porous structure of top soil and subsoil, while with the use of hydropeat (suspension) changes occur in the deeper strata (to 1 m). The reserve of productive moisture increases by 80-130%. For the first 3-5 years after application, there is intensive breakdown in soil of the plant residue contained in the peat. During this period, humus content reaches a maximum. In subsequent years it gradually decreases.

In light soil, peat aids in increasing absorption, because of which there is more rational utilization of applied mineral fertilizers. Improvement of water, physical and agrochemical properties of soil, as well as the increase in microbiological activity, lead to significant increase in soil fertility.

Quite often, peat bogs are used to raise agricultural crops, and in Belorussia this involves an area of about 1 million hectares. Maximum loss of peat is observed when cultivated crops are grown there, and minimum loss occurs when perennial grasses are raised. Grain crops occupy an intermediate position between these two.

The use of highmoor peat of the Sphagnum types with low degree of decomposition (up to 20%) is one of the promising means of expanding the feed base for the livestock industry. The distinctive feature of this peat moss is that it contains 65-80% polysaccharides. The Peat Institute of the Belorussian Academy of Sciences, together with other scientific research and planning organizations, developed and tested the technology for hydrolysis of peat by means of mechanochemical processing, with subsequent use of the hydrolysate as a substrate to raise feed yeast. There are some promising methods for preparing feed from highmoor peat, which can be easily used in sovkhoz and kolkhoz production with the existing equipment, for example, enrichment (saccharification) of peat by means of hydrolysis with weak hydrochloric acid solutions.

The institute's work of recent years demonstrated that it is possible to obtain a biostimulator of plant and animal growth through oxidative breakdown of peat in a medium of aqueous ammonia, with addition of certain oxidizers. The obtained products have a stimulating effect on development of the top [above the ground] part and roots of plants, and they elicit an increase in dry weight of green plant mass.

Sapropels are a serious source of organic raw material to produce fertilizers and feed supplements for farm animals. The general stock thereof in this republic is estimated at 4 billion cubic meters. Industrial facilities have already been constructed in Minskaya and Gomel'skaya oblasts for recovery of sapropels to produce fertilizers. Experiments have confirmed the high efficacy of these fertilizers with regard to productivity of potatoes and grain crops raised on soddy podsolic soil with a light [loose] mechanical composition.

It is planned to continue in the future with development and intensification of scientific research in the area of utilization of peat and peat bogs in agriculture: elaboration of scientific bases for selective regulation of physicochemical and biological properties of peat in order to produce new and complex fertilizers, feed supplements and biostimulators; examination of conversion of peat and change in its properties in mechanobiochemical and thermobiochemical destruction processes, as well as destruction in an alkaline medium, and development of new products with higher biological activity; elaboration of methods and technological systems for obtaining new granulated fertilizers, biostimulators, carbohydrate and carbohydrate-protein feed supplements.

T. N. KULAKOVSKAYA, academician of VASKhNIL and Hero of Socialist Labor, who is the director of the Belorussian Scientific Research Institute of Soil Science and Agrochemistry, observed that the problem of furnishing agricultural products to the public can be resolved only after the Non-chernozem Zone is developed and crop productivity there is increased by improving the nutritional balance of plants and increasing the volume of organic substances applied to soil.

In Belorussian SSR, about 70 million tons of organic fertilizers are used. In the last few years, peat has gained increasing use in agriculture, since it has the constituents required to augment fertility of light soil: humus, nitrogen, carbohydrates, trace elements and plant residue. It is applied in the form of composts, manure with bedding of peat, peat-mineral and ammonia fertilizers [TMAU]. The beneficial effect of peat on soil is manifested after a long period. One should use peat and manufacture products based on it in accordance with the specific distinctions of each type of soil, since an increase in amounts applied does not always yield the desired result. When making peat composts, bedding and TMAU, one must determine the optimum proportion of peat, organic and mineral components.

At the present time, the institute is working on problems of preserving humus in soil on an optimum level, increasing production of composts, bedding and others products based on peat. For these purposes, long-term experiments have been started in fields with light soil.

V. A. VASIL'YEV, head of the laboratory of organic fertilizers at the All-Union Scientific Research Institute of Fertilizers and Soil Science, stated that our country's agriculture will receive a sufficient amount of mineral fertilizers in the next few years. However, the question of humus content of soil is still a pressing one. Replenishment thereof is presently being done by application of manure and peat. Use of peat to prepare composts and as bedding material at livestock farms results in less loss of organic fertilizers; it permits mechanization of production and improvement of working conditions in agriculture. For this reason, it is imperative to build up recovery of peat for bedding and composting.

The following spoke at a session of the Peat Council: V. Ye. RAKOVSKIY, doctor of agricultural sciences and corresponding member of the Belorussian Academy of Sciences; L. A. KHRISTEVA and V. N. KRESHTAPOVA (Soil Institute); Yu. O. PLATINSKIY (Moscow Veterinary Academy); I. F. LARGIN (Kalinin Polytechnical Institute); A. A. KRYUCHKOV (Rostorf [RSFSR Peat Administration]); V. N. KOLESIN (RSFSR MTP [Ministry of Fuel Industry]); L. S. KASHCHENKO (Leningrad State University); T. S. KORENOVA (TsTBOS [expansion unknown]); and A. S. OLENIN (deputy chairman of the Peat Council). They stressed the importance of continued development of research in the area of recovery and agricultural use of peat, as well as products derived from it, for goal-directed regulation of soil fertility, expansion and strengthening of ties between the peat industry and agriculture, elaboration of a program for development of science dealing with peat in the future.

In view of the tasks confronting the peat industry, the Peat Council of the presidium of VASKhNIL hereby resolves: To deepen research on peat as an effective constituent of organic fertilizers and microbiological medium with increasing doses of mineral fertilizers; to develop and introduce progressive technology for large-scale production of high-grade, transportable peat products for agriculture; to organize the study of peat as raw material for the most effective use in agricultural production (products of biochemical synthesis, biologically active substances, antiseptics and disinfectants, etc.); to recommend that the All-Union Scientific Research Institute of Peat Production and Peat Institute of the Belorussian Academy of Sciences become actively involved in development of a program for scientific and technological progress in the peat industry covering the next 20 years.

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